The Chemical Age

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Notes and Comments

Fuel Research in Great Britain

PROFESSOR ARMSTRONG is always interesting and often amusing. He has just described fuel research as "the greatest failure he had witnessed," particularly "as conducted by the Fuel Research Board of the Department of Scientific and Industrial Research [for] it has never been under competent control, it has never had a definite purpose or policy, and it has done nothing of real value." This is a damning indictment. It cannot fairly be said that the Fuel Research Station has done nothing of real value. There are two sides to every question. We agree that no outstanding scientific or technical discovery has emanated from the Fuel Research Station itself. But a number of independent researches have been assisted financially which have borne fruit. The survey of British coals will prove of inestimable value to the colliery industry in the days to come. That industry is only just awaking to the fact that even the colliery owners know very little about the coals they mine and sell, they understand the art of mining—none better—but that is quite another matter.

No one but an official body such as the Fuel Research Board could hope to conduct a survey of this character. A vast mass of information has been amassed on all fuel subjects, partly by interchange of opinions, partly by laboratory research, largely by plant research. There is no doubt that a chemical manufacturer, paying the bill and looking for results, would be disappointed with what he has got for his money. He would be disappointed even he did not belong to the class pilloried by Dr. Pickard as expecting that "within a short time dividends would come through the door in a constant whirl" as the result of the work of a few research chemists.

The Real Object

THE invention of new processes of great commercial worth is not the object of a Government research department. That department should rather confine its activity to research upon subjects of national importance which are of interest to the furtherance of the trade of the country or are of importance to the national safety, but which cannot be undertaken by private enterprise because there is no immediate financial return. Something more, however, might be done in the way of telling the world what has been achieved. Manufacturers troubled by fuel problems, or undertaking new branches of activity connected with the fuel industries will find a wealth of information and assistance awaiting them, but these facilities are insufficiently known to be appreciated.

Whilst we do not maintain that nothing could be improved, we are far from agreeing on this occasion with Professor Armstrong that the best way to mend the Fuel Research Station would be to end it. It has been said by Dr. Lessing that the carbonising and fuel industries are chemical industries in a very real sense. The subsidiary tar distillation and sulphate of ammonia plants are conventional chemical plant; while the hydrogenation of coal and similar coming development such as the chemical utilisation of coal gas are direct problems for the chemical industry. The chemical industry has as real an interest in the future of the Fuel Research Board as it has in the future of the National Chemical Laboratory.

Men and Experience

THE letter contributed to our columns to-day by Dr. G. E. Foxwell raises a matter of extreme interest. The specification—the standard, call it what you will—set for the director research by Mr. West is a high one. It is true, as he says, that it is waste of money for manufacturers to set up elaborate research departments, unless they can find men to direct them. There are plenty of young men able to do research under guidance, but the initiation and the direction of research is quite another matter. Manufacturers who are progressive and anxious to improve their business must encourage research. They must be looking for chemists who are able, in Mr. West's words "to think five or ten years ahead, [possessing] a comprehensive grasp of economic trends and possibilities, and a born leader of men with personality and driving power." When such men are found, they can hardly be confined within the narrow limits of the research laboratory. The research laboratory may provide them with a home, an interest in life; but surely Mr. West has mistaken the functions of the chief chemist for those of the managing director. Much depends, of course, on the size of the firm. The capacity for an industrial outlook is not induced by the training and work of a research chemist; that no doubt explains why Mr. West believes there is a dearth of such men. The director of research, if he is to be really the man of vision, cannot be selected in general from the ranks of those who have been research chemists only. There are a number of research chemists, men whose names are known widely for their researches, who have also taken part in the business direction of the firm they have served. These men can appreciate problems in their proper perspective; they have both research experience and industrial experience. Add to this that spice of personality that makes a leader of men, coupled with the never-say-die spirit that overcomes

difficulties, and there are the ingredients of a director of research.

Dr. Foxwell asks how men are selected for such high industrial posts. In our opinion far too much stress is laid upon experience. A research department is not expected to produce results within a month; research is a slow process. Given a director possessing the necessary qualities, and any defects in experience will quickly be remedied. In another industry a young man of 28 without a particle of experience of the coal industry is making a success of his job as Director of the Coal Utilisation Council. Some experience, and a wide knowledge of science is no doubt essential for a director of reseach. It will be of interest to hear the views of our readers.

Problems of Mixing

WITH the steady evolution of new plant in step with the discovery of new processes and the adaptation of existing apparatus for speedier working and more thorough mixing, the subject of mixing has become almost a fine art. Whatever may be the particular branch of the chemical industry with which one is concerned, there is now available a proper machine for dry or wet mixing, performing the operation with scientific accuracy and thoroughness and ensuring the desired blend without damage to the material and with a great saving of time and trouble. Great as the progress of the past few years has been, it might have been even greater if that spirit of co-operation and good faith within the industry, which Mr. Eustace Alliott stressed at the Chemical Plant Manufacturers' Association dinner recently, had been given freer play. Almost every manufacturer has his own peculiar problem to overcome. Many of them have been solved by the ingenuity of the plant manufacturer, but there still remain many requiring a solution which can only be obtained by taking the plant maker into one's confidence, and we invite chemical manufacturers to co-operate with us in exploring the possibilities of solving these problems in a spirit of goodwill.

We remember that when the question of neutralising sulphate of ammonia arose great difficulty was experienced in mixing the neutralising agent with the acid sulphate. The problem was ultimately solved in a successful manner by using mixers in which helical blades revolved in opposite directions to make an intimate mixture of a small quantity of the neutralising agent with a large amount of the material which was to be neutralised. The gas industry would never have had the benefit of that discovery if it had not fostered that spirit of co-operation for which the industry is famous, and we must look to the chemical industry to practise similar principles of good faith which alone can place it on a prosperous basis.

The British Industries Fair

THE nineteenth British Industries Fair, which will be held in London and Birmingham from Monday next, February 20, to March 3, will be the largest and most representative display of British manufactures yet organised, showing an increase in area of about 18 per cent. over the Fair held in 1932. As on previous occasions, the Fair will be visited by members of the Royal Family. If Her Majesty's engagements permit, the Queen will visit the Olympia Section, which includes the chemical exhibits, on Tuesday and Thursday next week, and the exhibition of textiles and furniture at the White City on Wednesday. The Duke of York will visit Birmingham on Monday morning and will open the Castle Bromwich section of the Fair. On the same morning the Duchess of York will inspect the textiles section at the White City and will attend a parade in the fashions theatre. On Monday evening, the opening day of the Fair, the Prince of Wales will speak at the annual banquet at the Mansion House, when Mr. Walter Runciman, President of the Board of Trade, will preside. Prince George will attend a reception at the Guildhall which the Lord Mayor and the Corporation of the City of London are giving on Wednesday to the buyers and exhibitors.

The floor area of the buildings occupied in London and Birmingham will be nearly 30 acres, and the frontage of the indoor stands will amount to about 27 miles. The lighter trades and Empire exhibits at Olympia will occupy 270,524 sq. ft. and will represent 1,168 exhibitors, and the heavy industries at Castle Bromwich will cover 244,374 sq. ft. of stand area and represent 1,042 exhibitors, the White City sections bring the grand totals to 709,677 sq. ft. of stand area and some 2,575 exhibitors. In addition the outdoor exhibits at Birmingham will cover another 50,000 sq. ft. For the first time in the history of the Fair, buyers visiting the London sections will be charged 2s. for admission, receiving a badge admitting them for the period of the Fair. Buyers will be admitted free at Birmingham.

We Shed a Bitter Tear

STAGED for a worthy purpose, such an exhibition as the British Industries Fair should demand adequate publicity of the highest possible order. Buyers from the home and overseas market must be induced to attend, irrespective of other engagements. The general public, too, must take their share of the knowledge which is disseminated by an enterprise of this type, for in some branches of industry it is primarily the demands of the public that dictates the trend of manufactures. With the chemical industry this is not essentially the case; nevertheless, the public must still be educated upon the subject of new inventions and developments. Such knowledge, however, must be sound and not of the type which has come to us in the form of official propaganda entitled "Achievements of the British Chemical Industry: New Exhibits at the 1933 B.I.F." Herein we are introduced to silicon ester as a preservative for decaying building stones. "Britain's cathedrals," we are told, "are being *soaked in alcohol* . . . the old walls lap it up! Gallons and gallons of neat spirit. The alcohol is mixed with sand. Ordinary sand, of course, is largely silica, and *this sand is sifted so that only the silica remains* . . . This liquid sand is applied to the crumbling walls, and slowly it works its way into the very heart of the stone. Every crack is filled up and the sand then sets to a jelly of silica. Gradually the alcohol evaporates and an impervious coat of pure silica is left." What a pity Lewis Carroll is not with us! Such an excellent story he would have served up in a palatable manner. The nonsense we are here forced to read can only be ridiculed by those who see it in their trade papers, and when it appears in the popular newspapers there will be many among the general public who will find difficulty in suppressing their laughter.

Costing in the Chemical Industry

Extracting Useful Facts from the Available Plant Data

SIDELIGHTS of costing in the chemical industry was the subject of a lecture given by Mr. L. Staniforth, A.C.W.A., at a meeting of the Leeds and District Branch of the Institute of Cost and Works Accountants, held at Bradford on February 9. The lecturer, who is cost accountant to Brotherton and Co., Ltd., pointed out that many plants have now grown to a size which renders personal supervision impossible. The only reliable way by which an executive can judge efficiency is, therefore, through statistical reports. These reports can only be accurately obtained when a good cost system is in operation.

New methods are being introduced and improved machinery is being installed every day, with a view to reducing costs either by eliminating waste or increasing efficiency. It is impossible to judge whether proposed improvements are likely to reduce costs unless the manufacturer knows not only his total cost, but also exactly what items make up that cost. Items of costs are frequently lost when totals only is considered, but if properly segregated, so as to show what they are, they can often be materially reduced and in some instances eliminated. The term "costing" in chemical manufacturing goes much further, however, than the mere ascertainment of the "cost per unit" or "cost per lb." It implies the more important function of checking plant efficiency. If we arrive at maximum production efficiency in each stage of the process, the cost per unit or lb. will be automatically controlled.

Plant Efficiencies

For a chemical manufacturer to be able to meet the severe foreign competition of the present day it is imperative that his process be worked at the highest possible efficiency. Flow sheets and automatic recorders lend assistance to the cost accountant in the preparation of efficiency accounts. For this purpose each process should be treated as an individual unit and the chemist given standard "bogies" with which to compare the actual output of each part of the plant. In the manufacture of most products a theoretical chemical equation is available which enables the final production of a plant working at 100 per cent. efficiency to be calculated. This theoretical yield is used as the "bogey" and it naturally follows that if the same "bogey" be used throughout, the comparison of results in the same process will show whether progress has and is being made and continued and, of course, *vice versa*. The chemist need not worry about the material cost at the plant, as if these efficiency records show that the maximum quantity of finished products is obtained from a minimum quantity of raw material the cost will take care of itself.

Steam costs are a big factor in the manufacture of chemicals. The checking and recording of the costs under this heading may be divided into two sections—(a) the cost of producing steam, and (b) the economical consumption of the steam after it has been produced. The cost of producing the steam is usually expressed as the "cost per 1,000 gal. of water evaporated." It is therefore necessary to have some accurate means of recording the quantity of water evaporated into steam. In this connection reliable data is given by a Lea recording instrument, and by the provision of two large tanks for the storage of the feed water, the tanks being calibrated in gallons and the water fed to steam boilers from the tanks alternately.

The data required to ascertain the cost of producing steam include (1) gallons of water evaporated; (2) cost of feed water; (3) cost of materials for water softening plant; (4) tons of fuel used; (5) the average price of fuel delivered at boilers; (6) total cost of fuel; (7) stokers' wages; (8) cost of repairs; (9) depreciation; (10) cost per 1,000 gallons water evaporated; and (11) water evaporated per lb. of coal used. The cost per 1,000 gal. of water evaporated is the most interesting figure for the works manager.

Control by Mechanical Methods

Enormous advantages accrue to the management through the use of an efficient system of production and power control by means of mechanical methods. This is a subject which is of particular interest to those engaged in the chemical industry, in which temperature and pressure control is of paramount importance. Automatic recorders may be divided into three main classifications. There are temperature recorders, that is, thermographs; secondly, pressure and vacuum recorders; thirdly, quantity measuring recorders.

It is a peculiarity of chemical processes that no two reactions are exactly alike, even though they be carried out under apparently identical conditions. Under these circumstances control of the process can often only be effected by frequent observation of the temperature, which must be kept at certain levels in different stages of manufacture. The only effective method of temperature control is by means of a thermograph chart, each chart usually covering a period of twenty-four hours and thus providing a continuous record. It quite often occurs that such a chart is used for recording more than one set of temperatures; for instance, the same chart is used for recording the temperature of the water entering and also leaving the fuel economiser at the power house. From a comparison of these two sets of temperatures the efficient working of the economisers can be maintained each day and any falling off in efficiency is immediately brought to the notice of the engineer, who can then take steps to remedy it. Similar thermograph charts can show the temperature of the water entering and leaving the economisers; in another case they may show the temperature of the flue gases entering and leaving the economiser chamber. Here the object is heat exchange between the flue gases and the water in the economiser tubes, and by a comparison of the two charts the efficiency of the economiser can be computed.

High Boiler Efficiencies

Pressure recorder charts, showing the pressure on the steam boilers, serve a twofold purpose; they act as a warning to the stoker in the case of a gradual increase of pressure, and in cases where any shortage of steam has been experienced it is possible to trace from the chart whether this was due to the fault of the stoker in not maintaining a sufficiently high pressure.

A different type of automatic recorder is used for measuring the flow of water into the boiler; it consists of a chart revolving on a drum upon which a needle records the quantity of water entering the boiler throughout a period of twenty-four hours. From this the quantity of water used over any period can be obtained, and, knowing the calorific value and weight of the coal consumed the efficiency of the steam boilers as a whole can be obtained.

It is only by adopting these measures for recording necessary information that high boiler efficiencies can be obtained, and, what is more important, maintained at the same level over a period. Too often do we find that a management after obtaining up-to-date power plant does not take sufficient trouble to ensure that it is being worked at its highest efficiency and consequently are often in ignorance of the time potentialities of the plant. In addition to their use on the power plant, automatic recorders also play a big part in the control of production and both temperature and pressure charts are used extensively on the plant. Speaking broadly, automatic recorders fulfil their main function in the control of production. They act as a record of plant performance to the chemist or plant superintendent. Secondly, they indicate to the process worker whether a particular reaction is progressing favourably or not. Thirdly, when intelligently studied and tabulated they yield information which is of considerable value in improving yields and efficiencies.

Alterations in Schedules of Operations

The use of automatic recorders for a record of plant performance, however, is apt to be overlooked until some alteration in the schedule of operations is desired, but then their usefulness is immediately apparent. For example, it was recently desired to increase the production from twelve batches of a product to fifteen batches every 24 hours. This product had to undergo four distinct operations before it was ready for sale, these being the initial chemical reaction, then

the addition of further material and finally purification and drying. From a time study of each batch in its various stages of manufacture it was possible to prepare a fresh schedule giving the necessary increased production.

From the administrative point of view another important result of installing automatic recorders is their use as a branch of the research organisation. As an instance of this it was noticed that production on one unit of a plant was much quicker and gave far better yields than that on a second unit. Upon investigation it was found that, whereas on the unit giving better production the temperature was very steady and never exceeded a certain limit the temperature on the second unit was occasionally rather erratic and at times rose comparatively high. By making the second unit conform to the first the efficiency was increased. It is very probable that, had temperature recorders not been used the variation on the second unit would never have been found and the yield would have remained at a low level.

Statistical graphs used as a method of presenting costs have advantages over the old method of presenting masses of figures which had to be laboriously read through before arriving at the desired point of emphasis. Graphs in these days of efficiency are particularly desirable for giving the board of directors such particulars as they require at a glance. They may be made to cover costs, deliveries, orders on hand, time, waste and practically every phase of costing recorded by figures. It is the duty of the cost accountant to analyse such results and abstract the vital points.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

A Question of Personnel

SIR,—In the interesting correspondence between Mr. West and Professor Gibbs, there is one point that has been raised to which some exception must be taken. Mr. West states that "the crux of the whole matter . . . . is the dearth of really able men qualified to be directors of research. It is the lack of men . . . . capable of initiating research and directing it into the right channels."

Some of us are getting very tired of hearing this sort of thing. Nearly every "Captain of Industry" at some time in his life and at an expansive moment confesses to the admiring pressman that he has posts to offer worth £2,000 or £3,000 a year, but cannot find a man capable of filling these posts. No man can fill a high post unless he is given the opportunity to do so. Men can be found such as would fit Mr. West's specification without undue difficulty if a proper search were made. They are not everyday men, it is true, but if manufacturers went the right way to look for them, they are available and they can be found. I often wonder just how the search for such men is conducted; I know so many instances of able men who never get even the invitation to an interview when high posts are going.—Yours faithfully,

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Low Temperature Carbonisation

SIR,—I was interested to read in THE CHEMICAL AGE, February 11, p. 110, your article regarding low temperature carbonisation. What leads me to write to you is the first paragraph under the heading "an unexplored possibility," as I am interested to find out any information regarding the Turner low temperature carbonisation process which is worked by superheated steam, and also reasons why this process has not been more generally adopted.

The Turner process appears to answer a number of points raised in this particular paragraph of your article, as in the first place carbonisation is done by superheated steam which is first of all passed through turbines producing electricity as a by-product; it also produces a smokeless fuel apparently very suitable for domestic use, and a high quality oil which after distillation is, I understand, suitable for Diesel engines. The main point of interest regarding this process is, of course, the production of electricity as a by-product which is obtained very cheaply. An unbiased opinion of the process is very satisfactory from a mechanical and production point of view.

I am interested in low temperature carbonisation generally, and this process seemed to me to be one which answered many criticisms, and I should be glad to hear any comments as to why this process has not been taken up on a larger scale than the one small ten-ton-a-day plant which has been examined by the Fuel Research Boad.—Yours faithfully,

L. P. ANTROBUS

Levenot, Dunham Massey,
Cheshire.

Functions and Training of a Chemical Engineer

SIR,—I have read with considerable interest the reply of Mr. West to some observations made by me at Liverpool, upon the functions and training of a chemical engineer.

At the present time, there are two quite different types of chemical engineer, each of which is strongly represented in the membership of the Institution of Chemical Engineers. There is Mr. West's chemical engineer, who, after being trained as a mechanical engineer, gains through employment in a chemical works or on the staff of a chemical plant manufacturer an acquaintance with the chemistry of the materials and processes with which his work as an engineer brings him into contact. If he be an enthusiast, he supplements this experience by attending evening classes or by private reading. There is another type of chemical engineer who, after being trained as a chemist, obtains a job in some chemical works, gradually acquires a plant sense and learns by experience and also by study the methods employed by the engineer in constructing, erecting, repairing and operating the different types of chemical plant with which he is concerned.

Given the right kind of man—and this is of the utmost importance—either of these methods of training may in the long run produce a very useful and capable man, but he will not necessarily be a chemical engineer in the full sense of the term, as it is becoming understood to-day. Both methods of training are entirely unsatisfactory and extremely wasteful, both of time and material. In neither case does the man obtain a sufficiently comprehensive or systematic knowledge of real chemical engineering principles and practice.

The whole point of my address, which was delivered to an audience of chemists, was that chemistry is not enough and that a sound and systematic knowledge of "real" chemistry, as defined in my address, must be combined with a knowledge of engineering methods in order to provide a satisfactory basis for a subsequent systematic training in the principles of chemical engineering and in their application to the design and operation of chemical plant. In the same way, engineering is not enough; it must be blended with a sound knowledge of chemistry.

We want to get away from all this talk about the relative merits of chemists and engineers, which, after all, is entirely beside the point and arises mainly from a consideration of their respective defects. The chemical engineers of to-day and of the future have got to be trained very differently from those whose training we have just considered, and who include both Mr. West and myself.

Modern industry is developing rapidly and is using processes and plant of greater variety and complexity than in the past. It demands, also, that these processes shall be worked far more efficiently. A modern chemical engineer, who is being trained to meet these demands, must be scientific in his outlook and must have a thorough knowledge of the scientific principles upon which the plant necessary for the effective control of a chemical reaction is designed. Such a systematic knowledge can best be imparted by men with

the right training and outlook and in a university laboratory that is specially equipped for it.

Primarily, the chemical engineer's job is to design plant. This needs an intimate knowledge, not only of the function of the plant itself but also of the particular process which is to be carried out in it. The actual *construction* of the plant is essentially a job for the engineer. In practice, the plant is made either in the engineering department of the works or by some outside firm who specialise in chemical plant construction.

The chemical engineer cannot design plant satisfactorily unless he is thoroughly familiar with the methods that are employed in its construction, and this is an essential part of his training. Mr. West misrepresents my views when he states that I leave out engineering from the scheme of training. As a matter of fact, I attach far more importance to the chemical engineer's knowledge of engineering methods than Mr. West apparently does to his need for a knowledge of chemistry.

Chemical engineering is essentially a synthesis of chemistry, engineering and economics; it is not a mere mixture of them. I have already shown that it is possible to devise an undergraduate course which will provide the student with a thoroughly sound training in the fundamental principles of these three sciences, and—what is far more important—of the way in which they interact to produce the special knowledge and technique that is required by a chemical engineer who has to face up to the peculiar and intricate problems of chemical industry. It must not be forgotten, however, that, however comprehensive and efficient such a course of training may be, it can at best only teach the student how to *become* a chemical engineer; he spends the rest of his life gaining experience and skill in the practice of his profession. Obviously, however, with the right kind of training, a good man is more likely to become a chemical engineer, and to do so rapidly, than one who has been trained in an unbalanced manner, whether the bias be towards chemistry or engineering; also, he is far more likely to devedop into the kind of man who, having acquired a broad and far-seeing outlook, can direct production policy in a rapidly changing world.—Yours faithfully,

W. E. GIBBS.

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University College, London, W.C.1.

SIR,—Since the publication of my article on this subject, Professor Gibbs has kindly afforded me an opportunity of studying in some detail his methods and equipment for training chemical engineers at University College, and I now feel that he did far less than justice to these in his own paper. His equipment is comprehensive, well thought out and flexible, and on a scale far nearer that of an industrial works than that of an ordinary college laboratory, and he has a machine shop with full sized machine tools which would, except for space, adequately meet the requirements of a good sized factory, and is indeed far better equipped than the majority of chemical factory repair shops. It is evident also that Professor Gibbs attaches far more importance, and devotes far more attention to practical engineering subjects and methods than his paper would lead one to suppose, and that his students have ample opportunity and encouragement to make the most of the excellent equipment provided.

As regards the raw material for chemical engineers the fact has to be faced that at present 90 per cent. come from the chemical side and only 10 per cent. from the engineering side. This is a pity, for chemical engineering is a branch of engineering and not of industrial chemistry. In this connection the following definition, laid down by the Chemical Engineering Committee of the American Institute of Chemical Engineers is of interest:—"Chemical engineering, as distinguished from the aggregate number of subjects comprised in courses of that name, is not a composite of chemistry and mechanical and civil engineering, but is a branch of engineering, the basis of which is those unit operations which in their proper sequence and co-ordination constitute a chemical process as conducted on the industrial scale."

Two things are evident if the right class of men are to be attracted to this profession and given the best possible training within a reasonable number of years, say, five in all, including one year in the shops. First publicity is needed to bring home to parents and headmasters, first, that there is such a profession, secondly, what aptitudes are required for it, and, thirdly, what the scope and attractions of the profession are; for, to make the most economical use of the five years, the young man who wishes to go in for it should make up his mind to do so while at school, getting as much chemistry, physics, and mathematics there as he can, and arranging his subsequent training with that end in view from the very start.

Secondly, the universities and the technical colleges must provide more suitable courses, whether the student starts on the engineering or the chemical side, so that in two years he can get sufficient instruction in both engineering and chemical subjects to take full advantage of the final two years in chemical engineering proper. That is if, as at present, the raw material for the chemical engineering department is to be post-graduates from the engineering or chemical departments. Probably it would be more satisfactory all round if the chemical engineering department could take freshmen and offer them a full four years' course, the first two years of which would be devoted to purely engineering and chemical subjects, together with mathematics and economics, selected and arranged for the special end in view, and the last two years to chemical engineering proper. —Yours faithfully,

J. H. WEST.

Highgate.

Destruction of Clothes Moths

SIR,—May I refer to the article "Destruction of Clothes Moths," appearing on p. 124 of your issue ol THE CHEMICAL AGE, Frebuary 11, 1933. To prevent any misapprehension being caused it should be pointed out that none of the statements made are the result of original work done by the British Wool Industries Research Association, but that the article only summarises parts of the United States Department of Agriculture's, Farmers' Bulletin, No. 1353, published by the United States Government Printing Office, Washington, in 1923. The estimate of £1,000,000 damage done by moths per annum in this country is due to the writer ("Journ. Soc. Dyers Col., 1925, *41*, 155).

The writer was informed by the Department of Scientific and Industrial Research on February 4, that the article "merely represents a summary of existing state of knowledge" on the subject. If this is so, it can only be said that it is a most incomplete summary, for very many method of moth control are not even mentioned. In view ot work done and published by the British Wool Industries Research Association ("Journ. Textile Inst.," 1931, *22*, T154-T157) it it particularly surprising that no mention is made of mothproofing, a process which—it will be noted—has been used to an ever-increasing extent in the wool industry during the last decade.

Thousands of yards of wool fabrics are now being mothproofed by British manufacturers every week and mothproof garments have been on the market for years. Several mothproofing chemicals are now available, of which at least six have been tested by the British Wool Industries Research Association and of which they reported that they gave adequate proof of their efficacy and that wool treated with the commercial substances tested is "satisfactorily proofed against the action of clothes months." ("Journ. Textile Inst.," 1931, *22*, T157).

It is interesting to note that the introduction of mothproofing processes has led to new uses for wool being more fully developed than they otherwise would have been. The use of wool textiles in the engineering trades may be instanced, *e.g.*, for insulating electric wires, sleeper felts, etc. Though for these purposes wool has great advantages there is also the great drawback that it is liable to become motheaten and serious trouble has been caused by this happening in telephone exchanges. The use of wool which has been mothproofed is now eliminating this sources of trouble. —Yours faithfully,

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The Training of the Chemical Engineer

By H. W. CREMER, M.Sc., F.I.C.

Honorary Secretary of the Institution of Chemical Engineers

CONSIDERABLE reference has been made recently to the functions and training of the chemical engineer, and in the last two issues of THE CHEMICAL AGE emphasis has been laid upon the necessity for the Institution of Chemical Engineers to give an authoritative ruling in regard to his status, functions, and scope, together with recommendations as to his training. It appears to have been overlooked that these very important matters were amongst the first to be given the full consideration of the Council of the Institution from the earliest days of its existence. They were referred to by the late Sir Arthur Duckham in 1924, in the first presidential address to be delivered before the Institution. The second volume of Transactions, which contains this address, includes also a review by Sir Frederic Nathan of the work done by the Education Committee of the Institution, with special reference to the training of the chemical engineer. In the course of his remarks Sir Frederic said: "I think it is recognised that the most important work of this Institution in its early stages is to lay down as authoritatively as possible what should be the qualifications of a chemical engineer, and then, having defined these qualifications, to attempt to arrange so that the educational authorities of the country will give us the men that we want."

A definition of a chemical engineer had been drafted by the Provisional Council of the Institution, and was considered and amended at the first meeting of the Education Committee held in September, 1923. This definition, as amended, is as follows:—"A chemical engineer is a professional man experienced in the design, construction and operation of plant and works in which matter undergoes a change of state and composition." This definition of a chemical engineer follows the lines of Sir George Beilby's original definition of chemical engineering, in the paper which he read at a general discussion on the training and work of the chemical engineer held by the Faraday Society in March, 1917. The ground was covered very completely by the papers then read and in the discussion which followed, and these proceedings, which appeared in the "Transactions of the Faraday Society," Vol. XII, September, 1917, are most imformative.

The Underlying Principle of Training

Having defined a chemical engineer in general terms, the Education Committee next proceeded to a consideration of the knowledge and attainments which the Institution would require its members to possess, in greater detail than is contained in the paragraphs of the By-Laws dealing with the qualifications for membership and associate-membership of the Institution, graduates, and students. At the second meeting of the Education Committee, held in October, 1923, a memorandum on "The Training of a Chemical Engineer," embodying the general scheme agreed to at the previous meeting, was submitted and discussed. The underlying principle of the training outlined in the memorandum is to equip men who have received a good school education on the modern side with as thorough a general knowledge as possible of the principles of chemistry, physics, and engineering, followed by a course devoted to a more detailed study of purely chemical engineering subjects. It was stated that a man trained on these lines should develop in the works into a chemical engineer, and not into a chemist *or* an engineer, and that he should be able to apply the knowledge he has so obtained in dealing with the many chemical engineering problems involving chemical reactions on a technical scale. It was further stated that the chemical engineer must be a man occupying a somewhat high position, and having under him both chemists and engineers, so that his knowledge should be such as to enable him to co-ordinate the more detailed knowledge of the chemist and of the engineer, so as to produce a complete and harmonious whole and to become an efficient administrator. The question of workshop training presented some difficulty, the opinions of those consulted being about equally divided for and against this part of the training taking place between the school and college courses.

The memorandum contemplated a fourth year spent at a university or college, to be devoted to a more detailed study of chemical engineering subjects, and at the third meeting of the Committee, held in November, 1923, a memorandum to give effect to this portion of the "Outline of Training" was submitted as the "Outline of Subjects Special to the Training of a Chemical Engineer." The subjects were classified under the headings of (a) chemical engineering processes, (b) factory design and construction, and (c) general factory economics. The two memoranda were amended at further meetings of the Committee, and in their final form they were submitted to and approved by the Council in April, 1924.

Views of the Chemical Industry

At the same time the Council approved of the memorandum being circulated to a selection from the list of firms who were members of the Association of British Chemical Manufacturers, and to other industrial undertakings likely to be interested, for their consideration and remarks. The covering letter requested that careful attention might be given to the memorandum, and asked recipients to say whether, in their view, the training outlined was such as would be likely to produce men who would fulfil satisfactorily the work and duties of a chemical engineer. The Council also stated that it would be glad to receive and to consider any alterations or modifications which might be suggested. In the event of a firm employing chemical engineers, the letter asked for a confidential note giving information as to where they were trained, and the nature of their training and education. Further, in order to obtain the views of a wider circle of industries, a letter was later addressed to representatives of selected groups of the Grand Council of the Federation of British Industries, asking them to give the Council of the Institution the benefit of their own advice on the memorandum, and also to indicate the names of others in their respective groups who would be willing and able to express their views on the course of training proposed. The memorandum was revised by the Education Committee accordingly in the light of a large number of expressions of opinion received from the leaders of industries throughout the country, and steps were then taken to bring it to the notice of educational authorities with a view to their co-operation in regard to the training of chemical engineers. In its final form it was published in 1925, and has since been available on application to the Honorary Secretary of the Institution.

At about the same time arrangements were made for the first public examination for Associate-Membership of the Institution to be held. As is probably well-known, this examination is divided into two parts:—(a) "Home" paper, embodying questions of design which are to be worked out by the candidate during his spare time and for the purposes of which he may refer to any literature of which he has knowledge; and (b) four papers, which are taken under ordinary examination conditions.

The Subject of a Public Discussion

The general question of the training of the chemical engineer was again made the subject of a public discussion at the Ninth Annual Corporate Meeting of the Institution, held in April, 1931, when Mr. J. Arthur Reavell initiated a discussion on "The Education and Training of a Chemical Engineer," which was contributed to by some of the leading industrial and educational authorities. Consideration was given during the same year by the Education Committee to the desirability of modifying the memorandum and to other possible arrangements for improvement in and extension of educational facilities in chemical engineering. It will be appreciated that in matters of such primary importance to the chemical engineering profession it is essential that no recommendations of a far-reaching character should be made regarding them until they have received the fullest consideration of all the parties concerned. Meanwhile Imperial College, University College and King's College confine themselves at the present time to providing post-graduate courses only in this subject. The desirability of formulating suggestions for the provision of suitable training at an earlier stage has not, however, been overlooked.

Physical Tests on Paints, Varnishes and Lacquers

Their Bearing on Manufacture and Use

WHILE it may seem at first sight that a test need not vary with its objective, whether this be improvement or manufacturing technique, strengthening a specification, or indicating the most profitable method of utilising a protective material, yet, in actual practice, a considerable variation is likely to take place. For instance, said Dr. G. F. New, F.Inst.P., in the course of a paper read before the Manchester Section of the Oil and Colour Chemists' Association, on February 10, specification tests are likely to be more rigidly defined and carried out than are the others by reason of commercial and legal aspects of the contracts in which they are embodied. Tests for control of manufacture or utilisation form the raw material for specification tests; they are liable to rapid change in conformity with the changing character of the materials dealt with and it is only after they have been in use for some time that they are likely to be incorporated in a specification.

Of tests for liquids, those aiming at elucidating flow properties are probably the most important and at the same time, the least standardised. All methods involve a measurement of the drag between the fluid concerned and a solid surface in conjunction with which relative motion exists. The actual measurement may be taken in terms of time, mass or length, or derived units. The efflux type lends itself to more exact calibration and its errors are more closely specifiable than is the case with most of the other types of instrument, and for this reason is usually employed in research or control work requiring some refinement. It has an advantage over many others, moreover, in the ease with which the shearing stress imposed on the test material can be varied. Many fluids of interest to the paint and varnish industries are heterogeneous and show a variation in apparent viscosity with change in rate of shear. The extent of the variation in flow found wtih a definite change in shearing stress, conversely, may give an indication of the extent or type of heterogeneity existing. The study of viscous flow under various conditions therefore constitutes a valuable means of investigating the structure of the fluid whether it be an oil, varnish, paint or lacquer. The efflux instrument consists essentially of a capillary tube connected between two reservoirs. Shearing stress may be varied by applving pressure to the inlet reservoir, by varying the diameter of the capillary or by reducing the pressure in the receiving reservoir.

Optical Properties of Paint

The optical properties of paints and varnishes provide another example of physical features of the utmost technical and commercial importance the study and measurement of which has been, until recently, almost completely neglected. In the last few years, however, several instruments have been developed in America, on the Continent and in this country for the study of gloss, hiding power, etc. Some of these instruments are costly, cumbersome and quite outside the range of possibilities for the ordinary paint works. It is possible, however, for the ordinary factory workshop to make up photometric equipment refined enough for many tests arising out of problems of manufacture or application. The essential feature of such apparatus is a photometric cube by means of which a beam of light which originates at a standard source and is modified by passage through or reflection from a film of the material under test is compared with a second beam of light which can be varied in intensity. Six-volt car head-lamps form good light sources of high luminosity and small area, and while one lamp is used as the source of the light which is to be modified by the specimen under test a second lamp is moveable along a scale to provide the variation in intensity needed for matching.

The appearance of a paint film is always an important selling feature and often the dominant quality. This is regarded as self-evident by every manufacturer and substantial premiums are paid directly or indirectly to obtain ingredients which will enhance hiding power or gloss. There appears to be every reason therefore for instituting a close scientific control to ensure that this extra expenditure is only made where conditions call for it, and on the other hand, that the results obtained (for example, by incorporating a costly pigment of high hiding power) repay the expenditure involved. Without the exact control obtainable by the use of correctly designed scientific instruments the manufacturer is almost certain to err in one of two directions; either he will use insufficient of the costly pigment and so produce a low-grade article, or, what is more likely, in the endeavour to give his customer satisfaction, he will use more of this pigment than is actually necessary. In either case his ignorance involves a direct commercial loss. The problem is exactly similar to that met with in all branches of engineering. Before measuring instruments had been developed for examining the strength and elastic properties of metals, engineering structures were made far more massive and costly than was necessary, owing to ignorance concerning the factor of safety.

Paints with Fugitive Pigments

Another optical feature, namely colour, has given many examples of the utility of physical measurement over the whole range of our materials, pigments, mediums and paints. In one instance, neglect of the information provided by such measurement is continually providing grounds for dispute between manufacturer and consumer. This is the use of small proportions of relatively fugitive pigments in conjunction with either white pigments to form pale tints or coloured pigments to effect some slight modification in hue. The rate of change in appearance of such a mixture is largely dependent on the proportion of the fugitive pigment which is used and it cannot be stressed too strongly that weak mixtures must have but a very short life.

To illustrate this, series of tests fadings have been made with various pigments. The coloured pigment has been faded pure and mixed with the following proportions of a pure blanc fixe: 2.16, 9, 30.6, 99 and 999. The binding medium was silicon ester; the support has first grade drawing paper and the fading instrument used was the Kelvin Bottomley and Baird fugitometer with an air stream at 27° C. and a relative humidity between 55 and 60 per cent. At regular intervals, portions were removed from the test piece and at the conclusion of the exposure each set of such portions was measured on a colourimeter. When the fading curves were recorded on a trichromatic graph, the fading proceeded towards the white centre of the colour triangle but the curves for different dilutions showed considerable variation in rate and extent of fading. The pure colour shows practically no colour change in the first 1,000 hours and not much in the second 1,000 hours. The extent of the fading during 2,048 hours increases down to the dilution of the pigment with 30.6 parts of white and thereafter decreases. This decrease is a necessary consequence of the fact that at these high dilutions the original tint is at a shorter distance from the white point before exposure begins. It is quite evident, however, that the rate of fading increases in a most marked manner as the proportion of diluting pigment is increased.

Relative Fastness of Pigments

The reason for the more rapid colour change of dilute mixtures is probably that the on fading coloured pigment is usually changed to transparency and on a background of further coloured pigment as in the pure or concentrated samples the changed material is not detectable until it is present in sufficient quantity to cause considerable light scattering with the resulting appearance of whiteness. In a dilute mixture, however, where each particle of colour is surrounded by white pigment, the change in the coloured particle is evident at once. A further factor probably also enters, because a given physical colour change in a strong tint raepresents a smaller proportion of the saturation and is less obvious to the observer than is the same change in a dilute mixture.

It is often assumed that the relative fastness of coloured pigments can be determined rapidly and satisfactorily in high dilutions. Results under such conditions are certainly more rapid than when the pure or concentrated colours are employed but it is evident that the speeding up differs from one pigment to another and there is a probability that

relative fastness figures obtained under such conditions will differ considerably from those obtained with higher concentrations in the test samples. With pure colours the results are very slow and a compromise has been reached as a result of numerous tests, with a standard dilution of 1 part of colour to 9 parts of blanc fixe. It is probable that most coloured organic pigments are used in a concentration range near or above this 1 : 9 ratio and the test results should therefore be similar to behaviour in service. The practical conclusion to be drawn from this work is that if weak tints of low optical saturation are required they should be otained by the use of high concentrations of weak tinting power, and, in general, non-fugitive pigments.

Bronzing Characteristics

This observation provides the basis for a method of measuring bronzing, a pigment characteristic which is of great importance. Bronzing is a surface reflection from pigments having an intense absorption capacity for certain parts of the spectrum. The binding medium used for these dilutions of pigments was silicon ester; the actual proportion of solid silica in the dry film is not more than 10 per cent. and is probably mainly located between the closest portions of adjacent particles of pigments where it would tend to be drawn by capillary forces during drying. In other words, much of the surface of the actual pigment layer is probably not covered by anything except air. The bronzing appearance of a pigment layer can be affected by two groups of variables, namely, those connected with the manufacture of the pigment and those connected with its disposition in the final film. The size, shape and dispersive character may be affected by manufacture and each can influence bronzing. In the case of the medium, the refractive index and its wetting power for the pigment are the two chief factors. The pigment-medium ratio, both as originally compounded and also as affected by the absorbency of the support, must also be considered. Problems connected with the leafing of metallic bronzes and aluminium powders are very similar in character to some aspects of the pigment bronzing question.

The Argentine Trade Mission

Manufacturers Meet the Delegates

A LUNCHEON was given in honour of the Argentine Trade Mission by the directors of Benn Brothers, Ltd., publishers of THE CHEMICAL AGE, on Wednesday, at the Hotel Victoria, London, Mr. John Benn presiding. Mr. J. W. Beaumont Pease, chairman of Lloyds Bank and of the Bank of London and South America, proposed the toast of "Our Argentine Guests." Argentina, with the widest generosity had, he said, sent over the highest representative in her power, the Vice-President of the Republic, to head the mission which was paying a return visit to that of the Prince of Wales. Dr. Julio Roca bore a name which stood out boldly on the Argentine's roll of eminent men, for she owed a debt of gratitude, which she was only too willing to recognise, to the statesmanship and patriotism of General Julio Roca, the father of their guest, from whom doubtless sprang Dr. Roca's talent for leadership.

Dr. JULIO ROCA, Vice-President of the Argentine Republic, responding, said that in politics and government and in commercial and industrial attainments Argentina aspired to follow the example of Britain, in the same way that any well read Argentine aspired to be an English gentleman. He had a feeling that the negotiations which would be initiated immediately at the end of that banquet with the British Board of Trade would be successful. He had the greatest confidence that at the end of these negotiations the future of Argentine producers and of English manufacturers would be assured. He thanked Mr. John Benn, who had organised that reception, and Mr. Beaumont Pease, who had had the kindness to remember his father, who was really the best friend of the English people.

Anglo-Argentine Trade

The toast of "Anglo-Argentine Trade" was proposed by Sir GILBERT VYLE, K.B.E. He said that in spite of the tremendous drop in prices, we bought from the Argentine, in 1930, 56.6 millions, and in 1932 we still kept up our purchases as high as 50.9 millions. It was greater in volume if they would allow for the drop in the price. The other side of the picture was what the Argentine had bought from us. In 1930 their purchases were 25.2 millions, but in 1932 they had receded to as low a figure as 10.6 millions, and the question which they would like to submit to their friends was, if we had found it possible nearly to maintain the level of our purchasing from them, what had been the difficulty in nearly maintaining the same level of purchasing from us. We knew some of those difficulties, such as the enormous difficulty of exchange.

Dr. LEGUIZAMON, in reply, said Great Britain in the past had always been distinguished by the courage and tenacity with which her policies had been carried out, and this attribute of her rulers had belonged in the same measure to her traders. That steadfast spirit was still alive among Englishmen of to-day. They had the opportunity now of displaying their courage and faith in the convictions which led them to invest in Argentina about six hundred million sterling, by providing that co-operation and support which would make it possible for them to save the whole of it. "We are extremely grateful to Mr. John Benn and his fellow directors of 'Industria Britanica' for their charming hospitality," he added, "Even more than this, we are grateful for the chance of meeting to-day so many of you who are deeply interested in the result of our labours."

Lord PLENDER gave the toast of the health of the Chairman.

Our Debt to the Argentine

The CHAIRMAN, replying to the toast, said that he and his fellow-directors were proud to have the opportunity of enabling Dr. Roca and his colleagues to meet manufacturers who were actually trading with the Argentine, and whose presence would show the visitors the commercial goodwill towards their mission which existed throughout this country. Many different industries were represented at the luncheon, the company having come from Manchester, Sheffield, Birmingham, Glasgow and other important centres to welcome the Argentine guests. His only regret was that his father could not be present; he was having a much-needed holiday in the Mediterranean. Benn Brothers had a special debt to repay to the Argentine, as many years ago his grandfather went out to Buenos Aires as an official guest of the Argentine Government. He conveyed a letter of congratulation from the London Chamber of Commerce on the occasion of the Centenary Exhibition. He returned full of optimism for the future, convinced that Britain would long continue to co-operate in the development of that wonderful country. For those who went out to Buenos Aires two years ago, he could only add that, if the exhibition did nothing else, it certainly established many personal friendships, of which both countries were feeling the benefit to-day.

Among those present were Sir Feliz Brunner, Sir James Calder, Senor Jose A. Dodero, Mr. J. M. Eddy, Mr. Follett Holt, Sir Bertram Hornsby, the Hon. I. Lawson Johnston, Sir Robert McLean, Mr. J. W. Beaumont Pease, Lord Plender, Sir Malcolm Robertson, Sir Alliott Verdon Roe, Lt.-Col. R. T. G. Tangye, Sir John Thornycroft, Sir William Tritton, Sir Gilbert Vyle, Mr. V. Watlington, and Mr. F. C. Yapp.

Later in the day THE CHEMICAL AGE was represented at a reception given by the Argentine Chamber of Commerce to Dr. Roca and the members of the Mission at River Plate House, Finsbury Circus. There was a distinguished gathering of about 200 representatives of British commerce.

Manufacture of Pure Ferric Oxides

THE Docteur Roman May Co., of Poland, has started the manufacture of ferric oxides of considerable purity, and has placed them on the market, in three qualities, under the name of "rouge 100 pour cent." The Etablissements Polonais de l'Industrie du Zinc, of Bedzin, Poland, has started the manufacture of zinc oxide, which corresponds to the required prescription of the pharmacopœia.

Modern Candle Making

Manufacturing Difficulties and Remedies

THE historic aspect of candle making was described by Mr. David Allan, in a paper on "Candles and Candlemaking" given before the Institution of Petroleum Technologists at the Royal Society of Arts, on February 14. The origin of candles is lost in obscurity, but the earlier types were probably lengths of resinous wood. The last century saw many improvements and departures from the old methods of manufacture. A modern candlemaking machine consists of a frame holding pipes, to contain the wax, and a mechanism for centring the wick top and bottom. The candles are ejected from the pipes by rams. The wick is on spools under the machine, and at first wicking is drawn up through the ram by means of piercing stick which resembles a crochet needle. The machine is filled with material, then cooled, the top scraped off with a sharp spud or knife, and the candles wound up into the clamp where they are held. If the candles are clean the machine is ready to begin moulding candles. The cold water is then turned on and the candles set in the moulds. When sufficiently set the candles in the clamp are cut off by means of a sharp knife run along under the clamp. These are then thrown from the clamp on to the packing bench or other receiver. The top material is scraped off, using a sharp spud, and this material is either returned to the jacket pan or reboiled with a fresh batch. The candles left in the moulds are then wound up and the cycle goes on.

Opacifiers and Anti-Mottling Agents

In moulding stearine candles the material is filled cooled to a creamy consistency, and cold water must not be used for cooling as this may crack or otherwise damage the candle. The moulding of a stearine candle thus takes much longer than the more usual paraffin mixture. As regards the moulding of paraffins, all paraffins do not behave in the same manner, and frequently, in the absence of stearine, additions have to be made to prevent mottle or to prevent sticking. Materials to prevent mottle are numerous. Perhaps the most common is carnauba wax. Lead stearate is sometime used, also montan wax and its products. Mottle has also been prevented by removal of the dissolved air by means of steam just before filling, but the process has disadvantages. Small quantities of stearine prevent mottle and assist moulding, provided the stearine is of suitable quality. Stearine containing iso-oleic acid in any quantity is useless for this purpose, but in larger proportions is satisfactory. In the case of sticky waxes oil may be added, and for this purpose coconut oil is useful, but it may produce mottle. Some anti-mottle agents, such as lead stearate, cause stickiness and difficulty of ejection. For a number of years the benefits obtained by addition of stearine to paraffin for use in overseas markets has been widely recognised, and opacity has been looked on as an indication of quality. Such an appearance cannot now be taken to indicate the presence of stearine. Opacifiers have been discovered, the addition of a small proportion of which gives the appearance of a composite paraffin stearine candle.

Recent Developments

Of recent years there has appeared, particularly in Japan, considerable quantities of stearine made from hydrogenated Japan fish oil, known there as "stearine RO," also hydrogenated sperm body oil, a neutral wax known as "kokaro." They are of a different nature to the usual stearines on the market, in that they contain some very low melting point acids, which are undesirable. The sperm product does not give either the same opacity or stability to a mixed candle as ordinary stearines, but, particularly in Japan, where they can be produced cheaply, they are a serious competitor to paraffin wax. It might be mentioned here that two other methods of making candles have been tried, but as far as we know only one of these is being worked. This is the method of making as in taper making, where the wax coating is built up continuously by passing through a bath and dies till the required thickness is obtained. The candles are cut off and tipped by a machine and are also given some polish. The other method which we cannot trace as having been successful, is the method of extrusion. It is possible that with certain waxes the method is feasible, but it is not a method which can be adapted to all waxes.

The plaiting of the wick was first invented by Cambacères in 1836. Before this time it was necessary to snuff the candle and remove the unburnt wick as it became too long and caused much smoke. By plaiting the wick the end was kept at the outside of the flame, and by suitable treatment it was possible to keep the end clean and red. After the wick has been plaited it is treated to the caustic boil and bleaching usual to cotton, washed and centrifuged. After this it is treated with solution to assist clean burning. The composition of solutions are many and varied. The following salts being the chief used: borax, ammonium sulphate, ammonium choloride, potassium nitrate, potassium chloride and ammonium phosphate. The selection of a solution for this purpose is very important and many factors have to be kept in mind. The quality of the candle to be burnt is not unimportant or if any special conditions of burning have to be met. It is, however, hardly necessary here to enter any further into details of this.

Regulation of the Wick

The regulation of the wick and the material for night lights is a matter that requires constant supervision, if a regular burning time is to be obtained. The setting point of the wax is also adjusted to the climate in which they are intended to be used. The setting point has to be high enough to prevent the lights becoming misshapen and low enough to be melted completely at the lowest temperature they are likely to be used. This is an ideal which is not always capable of attainment, but is usually so under average conditions. The rate of consumption is low, being about 40 grains per hour, as against about three times that for a candle.

With regard to the uses of candles, there are three main uses; the first is ordinary domestic use, the second is the use for religious purposes, and the third for industrial purposes. The vast majority of candles used in the United Kingdom are for domestic purposes; there is also a considerable consumption for religious purposes. In the industrial uses are mining and boiler-making.

Brewery Water Purification

A Useful Application of the Catadyne Process

THE importance of colloidal silver in the treatment of water for use in the brewing industry is dealt with in an article which appears in "Woch. Brau.," 1932, 49, 377-381, abstracted in the February issue of the "Journal of the Institute of Brewing." The bactericidal action of minute amounts of certain metals dissolved in water has been extensively studied since Naegeli first observed this "oligo-dynamic" action. Krause prepared a special form of silver, on contact with which water will dissolve in 2 hours, 0.015 to 0.02 mg. of the metal per litre, a concentration sufficient to destroy all pathogenic organisms. Recently, the German Catadyne Co. has introduced an electro-catadyne process by which much higher concentrations of silver can be obtained. The water to be treated is passed through a closed metal apparatus containing silver electrodes between which a direct current is passed. The consumption of current is small, one ampere-hour sufficing to produce a concentration of 0.1 mg. of silver per litre in 20 to 40 cu. m. of water, and this concentration will sterilise natural waters which are biologically unsatisfactory. The author, H. Lüers, found that culture yeasts, in absence of organic matter, are entirely killed in $\frac{1}{4}$ hour in catadyned water containing 25 γ of silver, *i.e.*, 0.025 mg. per litre. For wild yeast $\frac{1}{2}$ hour in water containing 100 γ was sufficient. Beer sarcina proved much more resistant, requiring a concentration of 400 to 500 γ. From large scale experiments carried out in a Munich brewery it appears that catadyned water containing 500 to 600 γ might be used for sterilising pipes and other apparatus, provided all soluble extract and deposits, such as beer-stone, are first removed. In the absence of organic matter this concentration of silver will kill all brewery organisms in a reasonable time (*e.g.*, half-an-hour), with the exception of mould spores.

Non-Ferrous Metals in the Food Industry

Need for Co-operation between Food Chemists and Metallurgists

A JOINT meeting of the Food Group of the Society of Chemical Industry and the London Section of the Institute of Metals was held in London, on February 8, to discuss the problems connected with the use of metals in the preparation and packing of foods. Dr. L. H. Lampitt, chairman of the Food Group, presided; Mr. S. L. Archbutt, chairman of the London Section of the Institute of Metals, was also present. Papers were presented by Mr. T. N. Morris and Mr. J. M. Bryan, of the Low Temperature Research Station, Cambridge.

Mr. T. N. MORRIS mentioned some of the typical uses for metals in the food industries, such as for heating pans, autoclaves, evaporators, heating coils, steam nozzles, pipe lines, tubes, moulds and cutting tables, cutting machines, centrifuges, filters, strainers and containers and packing materials. The metals available included copper, aluminium, nickel, monel metal, alloys of nickel and chromium, German silvers, phosphor bronzes, brasses, aluminium alloys, solders, stainless steels (here included because they usually contained between 20 and 30 per cent. of non-ferrous metals), tin coatings on copper, and aluminium and zinc coatings on iron. The variation of conditions in the food industries, he said, were very wide. The metals came into contact with acids, such as citric acid, and there were sometimes traces of preservatives or bleaching agents. Contact between the food and the metal might be intermittent, or very prolonged. None of the metals mentioned, however, were likely to do any harm when taken in the quantities in which they might be present in the foods prepared in contact with them, but they were likely to be offensive to the taste long before their quantity was sufficient to prove harmful. Silver, at its present price, was a metal worthy of consideration for coating, in cases where corrosion troubles existed, but when used on copper, if it became worn or scratched, the electrical action between the two metals would enhance the corrosion of the copper. It was, therefore, important to renew the silver coating as soon as it showed signs of being scratched. Tinplate had a potential rival for many purposes in the aluminium plate recently made in Germany, and this rivalry might be extended to cans if the mechanical difficulties could be overcome. Meanwhile, tinplate still held the field for containers, but no effort should be spared to increase its resistance to corrosion.

Effect of Air on Rate of Corrosion

Mr. J. M. BRYAN also discussed some experiments carried out at the Low Temperature Research Station, these being concerned with the behaviour of some specimens of metals and alloys in air and without air, after immersion in ½ or 1 per cent. solutions of citric acid at one temperature. Taking a general view of the results, he said, the outstanding features were the enormous effect of air in increasing the rate of corrosion of nickel, copper and tin and their alloys, and that air tended to be beneficial in the case of the group of metals, including chromium, aluminium, etc., where protection was due to a film of oxide.

Mr. N. D. SYLVESTER (J. Lyons and Co., Ltd.) discussed some methods which he had applied in testing corrosion, and urged that some of the short-time laboratory experiments were misleading unless the results were confirmed under more practical conditions. He pointed to experiences obtained in practice which would not be predicted from the laboratory tests.

Dr. C. H. DESCH, F.R.S., commented that it was satisfactory to learn from Mr. Morris that the metals ordinarily in use in the preparation and packing of food, when properly used, were not sensibly toxic. Copper had been favoured as a material for domestic cooking utensils for centuries, and was entirely satisfactory so long as it was perfectly clean, though the products of corrosion of copper were highly toxic. A metal such as copper had a distinct taste, and he believed that metallic copper in contact with water tended to exert a bactericidal action even when the quantity passing into the solution was too minute to be detected by micro-chemical tests. If that were true, one wondered whether it was possible that such traces of copper as could exert a bactericidal effect could have any effect upon those minute but extremely important constituents of many foodstuffs which were coming to be recognised as essential—substances present to the extent of only a few parts per million. He said it was important to bear in mind that the effect of pure acid was very different indeed from that of the same acid in the presence of colloids; it had been mentioned that the colloids present in ordinary foods exerted considerable influence—as a rule an inhibiting influence. There was also the effect of adulterants; the action of vinegar on cutlery steel was different from that of a solution of acetic acid of the same concentration. Dealing with some of the tests referred to by Mr. Bryan, he said it was curious that in one case the abrasion of copper appeared to have increased its resistance to attack by acid. He wondered whether the result in that case was due to cleaning from the surface something which formerly had tended to accelerate the corrosion; otherwise it was difficult to understand the result. The degree of resistance to corrosion possessed by a pure metal might be altered to a small extent by the addition of a minute quantity of another element, but he did not know whether practical use had been made of that fact.

Silver as a Lining for Processing Plant

Mr. D. MCDONALD (Johnson, Matthey and Co., Ltd.), in a paper on the applications of silver in the food and allied industries, said that apart from revolutionary fluctuations in price, it should maintain its place beside the other metals of commerce in those industries. It was used in the vinegar and pickle boiling industries, and especially in branches where the distillation of acetic acid took place. This acid, particularly at the moment of condensation from the vapour stage, was extremely corrosive and attacked most metals, but silver withstood it admirably, and many plants of several hundredweights had been fabricated in pure silver in this industry. He mentioned one which had been in use continually for two years, and showed no sign of corrosion. In the jam and confectionery trades, in the pulping of fruits and the subsequent handling of the pulp and juices, it was being applied increasingly, and it seemed to be the only metal which would cope satisfactorily with all the troubles experienced there. Quite large vessels, up to 6 ft., in diameter and of complicated shape, could easily be lined with silver, and spindles, paddles and all kinds of mixing gear could be covered in the same way. The thickness of metal employed was normally of the order of 0.03 in., so that the expense was of ordinary dimensions. The linings were satisfactory in practice, and heat could be applied by external steam jackets without causing separation and blistering.

Dr. SELIGMAN (past-president of the Institute of Metals) said it was difficult to generalise on some of the experimental results obtained by Mr. Morris and Mr. Bryan. Referring to the extraordinary effect of the abrasion of copper which they had mentioned, he said one must not doubt the result, but that there was any general application of that he felt grave doubt. It had been shown by Mr. Chaston Chapman that freshly abraded capper had disastrous effects on the growth of yeast, whereas copper which had been allowed to tarnish had not such effects. As to the production of taints in milk, some investigators had suggested that the primary effect of copper in that connection was to restrain certain bacterial growth and to permit of other growths from which the taints ultimately developed under the combined action of oxygen and light. To members of the Food Group he emphasised the fact that they could help metallurgists very materially by devising methods by which the latter could test their products and assure themselves of their suitability for the purposes in mind. Knowing the requirements of the food chemists, the metallurgist might be able to give in much more precise form the information which the food chemists required.

Mr. BRYAN said he had no explanation to offer of the results he had obtained with specimens of abraded copper. The strips were immersed in corroding medium for 14 days, then washed in boiling water, dried and weighed.

British Celanese, Ltd. v. Courtaulds, Ltd.

Reserved Judgment

IN the Chancery Division, on Monday, Mr. Justice Clauson delivered his reserved judgment, in the action by British Celanese, Ltd., of Celanese House, Hanover Square, W., against Courtaulds, Ltd., of St. Martin's-le-Grand, E.C., claiming injunctions restraining the infringement of certain patents relating to the production of artificial silk.

The plaintiff company alleged that between January, 1926, and July, 1931, the defendant company at its Coventry works made or sold materials and used machinery constructed in breach of the patents.

The infringement of the patents was denied and the defendant company alleged that they were invalid on various grounds, chiefly prior publication and prior general knowledge. They claimed for revocation of the patents on these grounds.

Sir Arthur Colefax, K.C., Mr. Craig Henderson, K.C., and Mr. E. J. Neep, and Mr. H. D. Russell Clarke, instructed by Messrs. Faithfull Owen and Fraser, appeared for the plaintiff company, and Mr. James Whitehead, K.C., Sir Stafford Cripps, K.C., Mr. Trevor Watson, K.C., and Mr. Geogrey Tookey, instructed by Messrs. Bristows, Cooke and Carpmael, were for the defendant company. Mr. L. W. Heald held a watching brief on behalf of Cellulose Acetate Silk Co., Ltd.

His lordship, in his judgment, said in this action the plaintiffs sued defendants in respect of certain patent rights vested in them. Defendants in their defence sought a revocation of the patents. The action concerned the manufacture of cellulose acetate silk and the process and apparatus employed. Plaintiffs claimed under their patents a monopoly. The answer of the defendants was that the plaintiffs' patents were void. Proceeding, his lordship said that silk spinning had been known for centuries. Some time prior to the great war the artificial silk industry became an established industry. It was then carried on in two or more ways or processes, the defendants being the pioneers of the viscose silk industry. Cellulose acetate was produced by the plaintiffs.

The first patent was No. 165,519, and under it a monopoly was claimed, that it was an inventive step and disclosed subject matter. One of the points was whether there had been anticipation. The second patent was No. 198,023, which related to cap spinning, and his lordship observed that cap spinning for textiles was an old process. The third patent was No. 203,092 which related to an apparatus for securing uniformity of product. With regard to the first patent his lordship proceeded to review the earlier patent, starting with Clark's patent in 1887.

There had been various experiments, which witnesses had dealt with fully and he did not intend to burden his judgment with them. Certain features of common knowledge were not in dispute. Evidence showed many things including the desirability of obtaining uniformity and so on. The specification of this patent was reasonably clear and intelligible, as also was the claim to spinning downward and winding the filament outside the casing, and this appeared to be the claim in the matter. In 1920 spinning in an enclosed casing was in common use, and downward spinning was also done, and by that time it was evident that its adoption was no inventive step.

Patents Held to be Invalid

The crux of the whole case so far as concerned the first patent was what was the discovery, inventive step, and subject matter. According to the plaintiffs the inventive step was the spinning filament outside the casing. Plaintiffs claimed to prevent other people using the processes, but told the world nothing that it did not know before.

In his lordship's opinion the first patent disclosed no subject matter and he held that it was invalid.

Dealing with the second patent, his lordship said it dealt with cap spinning and he was satisfied it included twisting. There was nothing novel in it and he held that it was bad for want of subject matter, and therefore the plaintiffs' claim failed in the second patent.

The third patent dealt with the apparatus, and it was impossible for him to hold that that claim was valid.

The judgment he pronounced, was that plaintiffs' action would be dismissed and on the defendants' counter-claim there would be an order for revocation of patents 165,519, 198,023 and 203,092. If the defendants desired it and informed the registry of their desire to appeal, he would suspend the order of revocation for three weeks, the appeal to be entered in the meantime and then there would be a stay pending the appeal. The defendants must undertake not to apply for amendment of the three specifications during the period of suspension. The action was dismissed and plaintiffs would have to pay the costs.

London's Gas Supply in 1932

Sir David Milne-Watson's Optimistic Outlook

PRESIDING at the 226th ordinary general meeting of the Gas Light and Coke Company, in London, on February 10, Sir David Milne-Watson, governor of the company, said there had been a decrease of 2½ per cent. in gas sold in 1932, largely due to the general depression in trade. The revenue from gas fell by £220,000, but there had been an increase in the gas sold for public lighting.

There had been a large increase of £142,000 in the revenue from tar and tar products, due to improved business in road tars and pitch and to the company's ever-increasing production of benzol. Benzol was the only native motor spirit produced in this country and when mixed with petrol or used alone it was one of the finest motor spirits known. In the past they had made as much as £200,000 to £300,000 a year profit from sulphate of ammonia, but this year they had made a loss of £4,000. He hoped, however, that by the arrangement reached by synthetic ammonia plant owners in various countries to prevent over-production, the senseless and ruinous competition between producers would be stopped, and that the sulphate of ammonia industry would be able to make at least some profit.

The balance transferred to the profit and loss account was £2,035,000, against £2,031,000. The balance, after adding £12,000 received from the Treasury in respect of the Development Act, 1929, and after allowing for interest on borrowed money for the year and the dividends distributed in respect of the June half-year, left £914,000 from which to pay dividends for the December half-year. This enabled the directors to recommend the usual dividend on the 4 per cent. consolidated preference stock, the 6 per cent. Brentwood redeemable preference stock and the 3½ per cent. maximum stock, and a dividend at the rate of £5 12s. per cent. per annum on the ordinary stock.

With regard to the use of gas for industrial purposes they actually served, for various industrial purposes, some 14,400 factories in their area dealing with the manufacture of bread and biscuits, sweets, paint and varnish, motor cars and tyres, aeroplanes, wireless and television sets, gramophone records, electrical cables, tennis rackets; in fact, almost everything under the sun.

The company had joined the South Eastern Gas Corporation, Ltd., and had obtained a controlling interest therein. The corporation held the stock of certain gas undertakings, including Folkestone, Deal and Walmer, and Whitstable. The arrangement would be to the advantage not only of the companies taken over by the corporation, but of the Gas Light and Coke Co. itself.

The report and accounts were unanimously adopted, and at an extraordinary general meeting which followed, the company's Bill now before Parliament was approved.

British Overseas Chemical Trade in January

A Slight Decline in Exports and Imports

EXPORTS of chemicals, drugs, dyes and colours during January amounted to a total of £1,351,754, being £78,052 lower than the figure for January, 1932. Imports totalling £728,460 were lower by £75,183, and re-exports totalling £30,721 were lower by £20,236, as compared with January, 1932.

	Quantities. Month ended January 31, 1932.	Quantities. Month ended January 31, 1933.	Value. Month ended January 31, 1932. £	Value. Month ended January 31, 1933. £
Imports.				
Acetic Anhydride .. cwt.	394	504	1,170	1,545
Acid, Acetic .. tons	1,139	14,711	40,136	26,877
Acid, Tartaric, including Tartrates .. cwt.	1,197	2,575	2,888	8,771
Bleaching Materials ,,	7,886	4,911	17,563	6,048
Borax .. .. ,,	20,731	4,722	11,317	2,484
Calcium Carbide .. ,,	72,073	87,442	47,403	48,835
Coal Tar Products, not elsewhere specified value	—	—	804	1 623
Glycerine, Crude .. cwt.	162	521	210	882
Glycerine, Distilled ,,	530	907	1,064	1,636
Red Lead and Orange Lead cwt.	2,973	2,226	4,361	2,079
Phosphorus .. ,,	—	—	5	—
Potassium Nitrate (Saltpetre) .. .. cwt.	9,187	2,620	8,074	2,995
Kainite, etc. cwt.	42,070	43,429	7,296	7,324
Other Potassium Compounds .. .. cwt.	46,466	66,970	35,173	48,262
Sodium Nitrate .. ,,	62,600	2,001	20,863	695
Other Sodium Compounds cwt.	30,667	22,319	24,524	15,874
Tartar, Cream of .. ,,	865	380	3,557	1,318
Zinc Oxide .. tons	136	41	3,099	677
Other Chemical Manufactures .. .. value	—	—	168,362	174,241
Quinine and Quinine Salts oz.	69,549	98,050	6,993	10,467
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	218	3,190	1,058	23,276
Other Drugs .. value	—	—	97,174	107,805
Intermediate Coal Tar Products .. cwt.	41	12	546	133
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic ,,	—	—	—	—
Other Dyestuffs .. ,,	4,020	3,906	96,801	80,981
Cutch .. .. ,,	909	1,248	1,171	1,458
Other Extracts for Dyeing cwt.	3,888	1,919	13,204	6,907
Indigo, Natural .. ,,	—	6	—	124
Extracts for Tanning (Solid or Liquid) cwt.	92,236	65,426	75,246	47,318
Barytes, Ground .. ,,	23,842	20,345	4,525	3,900
White Lead (Dry) ,,	9,430	5,170	13,514	6,378
Other painters' colours and materials .. cwt.	64,161	67,109	95,482	81,547
TOTAL .. value	—	—	803,643	728,460
Exports.				
Acid, Sulphuric .. cwt.	10,718	7,038	4,458	3,869
Acid, Tartaric, including Tartrates .. cwt.	1,221	486	5,234	2,231
Ammonium Chloride (Muriate) .. .. tons	558	351	9,591	6,496
Ammonium Sulphate ,,	23,915	26,941	126,279	144,599
Bleaching Powder (Chloride of Lime) .. cwt.	29,548	32,343	9,555	9,286
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	—	—	—
Benzol and Toluol gal.	1,067	8,681	133	1,041
Carbolic Acid (Crude) gal.	5,731	17,116	627	1,930
Carbolic Acid (Crystals) cwt.	866	314	2,293	1,101
Cresylic Acid .. gal.	94,368	78,269	10,266	8,576
Naphtha .. gal.	2,139	3,114	234	221
Naphthalene (excluding Naphehalene Oil) cwt.	6,930	5,269	2,504	1,915
Tar Oil, Creosote Oil, etc. .. .. gal.	1,369,705	278,027	30,816	6,873
Other Sorts .. cwt.	15,449	11,923	6,881	7,381
COAL TAR PRODUCTS (Total)	—	—	53,754	29,038
Copper, Sulphate of tons	2,940	2,366	50,571	36,023
Disinfectants, Insecticides, etc. .. .. cwt.	30,419	33,889	66,219	80,295
Glycerine, Crude .. ,,	2,456	597	3,487	1,005
Glycerine, Distilled ,,	15,425	12,049	30,759	23,428
Potassium Chromate and Bi-chromate .. cwt.	1,464	1,100	4,109	2,845
Potassium Nitrate (Saltpetre) .. .. cwt.	692	1,159	1,244	1,996
Other Potassium Compounds .. .. cwt.	4,697	6,261	8,714	8,742
Sodium Carbonate, including Crystals, Ash and Bi-carbonate .. cwt.	390,092	231,389	103,098	61,530
Caustic Soda .. ,,	139,333	151,269	92,309	102,693
Sodium Chromate and Bichromate .. cwt.	2,333	2,324	4,774	4,841
Sodium Sulphate, including Salt Cake .. cwt.	11,442	26,927	1,889	3,243
Other Sodium Compounds cwt.	168,845	94,335	99,851	79,243
Zinc Oxide .. tons	659	651	14,514	12,516
Other Chemical Manufactures .. .. value	—	—	216,857	218,171
Quinine and Quinine Salts oz.	79,087	115,765	9,619	15,920
Other Drugs .. value	—	—	232,264	239,817
Dyes and Dye-stuffs (Coal Tar) .. .. cwt.	10,150	7,421	93,985	72,958
Other Dye-stuffs .. ,,	13,389	15,514	8,859	11,671
Barytes, Ground .. ,,	1,958	778	820	343
White Lead (Dry) ,,	1,768	1,951	3,007	3,499
Paints and colours in paste form) .. .. cwt.	23,221	23,751	40,280	40,174
Paints and Enamels prepared .. .. cwt.	22,751	23,379	66,882	66,232
Other painters' colours and materials .. cwt.	37,013	38,134	67,424	69,050
TOTAL .. value	—	—	1,430,406	1,351,754
Re-Exports.				
Acid, Tartaric, including Tartrates .. cwt.	93	17	521	108
Borax .. .. ,,	440	20	352	16
Coal Tar Products not elsewhere specified value	—	—	15	26
Potassium Nitrate (Saltpetre) .. .. cwt.	35	50	57	88
Sodium Nitrate .. ,,	537	1,075	230	470
Tartar, Cream of .. ,,	220	238	1,037	997
Other Chemical Manufactures .. .. value	—	—	11,063	8,285
Quinine and Quinine Salts oz.	24,184	4,782	2,591	858
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	230	158	2,150	1,941
Other Drugs .. value	—	—	28,424	15,282
Cutch .. .. cwt	184	52	331	69.
Other Extracts for Dyeing cwt.	68	170	347	709
Indigo, Natural .. ,,	—	6	—	128
Extracts for Tanning (Solid or Liquid) cwt.	1,745	281	1,967	249
Painters' colours and materials .. .. cwt.	1,236	438	1,745	797
TOTAL .. value	—	—	50,957	30,721

The British Industries Fair, 1933

Exhibits at the London Section

THE main topic of conversation at this year's British Industries Fair will undoubtedly be the Ottawa Conference, and the increased volume of trade that is confidently expected to result from the reciprocal agreements there concluded. The most important development from the chemical point of view is the recognition by the Dominions that they may have been rather too enthusiastic in fostering and protecting by high duties, manufactures which were not, and for various reasons never could be, economically sound. The new attitude of mutual co-operation in deciding which manufactures are capable of development in the Dominions and which products are better and cheaper made in the United Kingdom is the first step towards the replacement of wasteful competition by complementary production, to the benefit of all concerned.

The chemical industry is fully alive to the possibilities opened up by the Ottawa agreements, and a striking lead was given by Dr. Armstrong, chairman of the Association of British Chemical Manufacturers at the annual general meeting in October, 1932, when he emphasised the value of co-operative effort, close study, and contact with the Dominion markets, in a speech that was full of suggestions prompted by his own personal knowledge of the conditions. The display in the Chemical Section will show that the industry is equally well placed from the technical point of view to cater for all requirements.

Services Rendered by the A.B.C.M.

The Chemical Section, which is again under the auspices of the Association of British Chemical Manufacturers, has this year been moved towards the front of the Main Hall to a position more in keeping with its places as one of the key industries of this country—an industry which is founded, controlled and advanced by the application of science and and scientific methods. The association will have an office on Stand No. A.40b, where literatre will be distributed and inquiries answered as to sources of supply. The literature will include the association's main directory, covering all the products of its members, in six languages (English, French, German, Italian, Spanish and Portuguese) and the new directory of British fine chemicals, which will indicate the manufacture of over 3,000 fine chemicals in general use. The new directory of the British Chemical Plant Manufacturers' Association, an affiliated organisation, will be distributed to those interested in the purchase of the plant and equipment used in a wide range of industries. Information regarding the services rendered to the chemical industry by the Association of British Chemical Manufacturers will also be available with samples of the association's regular publications, such as its monthly summary of chemical trade, its safety circulars, and its quarterly safety summary.

Achievements of the Industry

Last year the Association of British Chemical Manufacturers inaugurated the first of a series of special displays, drawing attention to the achievements of the chemical industry during the year in the way of new materials produced in this country since the last Fair. Such products may be divided into two classes :—(a) Well-known products now being made either for the first time in this country or by some entirely new process, and (b) new discoveries whose uses are still under investigation. The material selected for display on the association's stand this year is hydroquinone, which has just been removed from exemption from Key Industry Duty under the Safeguarding of Industries Act, as it is now being produced in adequate quantity in this country. The main use of hydroquinone is as a developer for photographic work and the display shows the technical steps in the manufacture, and illustrates the uses of the product in X-ray work and photography generally.

Among the other new products mention may be made of sodium carbonate mono-hydrate. This product is one which is being manufactured by a new process. It is remarkable chiefly for its very attractive appearance. It has a well developed crystalline form, the crystals being aggregated into small groups of a spherical character. They can be manufactured if desired in several sizes, from pinhead to approximately 3/16 in. diameter, and are exceedingly stable and hard. Secondly, the product is extremely pure, one of the purest commercial form of alkali known. It has, therefore, a variety of uses. It can be dyed and perfumed, and as such provides an attractive form of bath salts. It can be used for the production of pharmaceutical chemicals and for photography on account of its purity, while it has uses in the production of a number of well-known chemicals whose manufacture calls for the provision of a very pure form of alkali. A number of domestic uses can also be envisaged.

Granular soda ash is another new product. It is a dense sodium carbonate in granular form, which is being manufactured particlarly for the glass industry and for other users who desire a dense sodium carbonate which is free-flowing and free from dust.

A Review of the Stands at Olympia

Albright and Wilson, Ltd. (Stand No. A.86) well-known for the manufacture of fine chemicals, are again showing a comprehensive display of phosphorous and its derivatives, which include B.P. and technical grades of phosphoric acid, phosphorous oxychloride, tri- and penta-chloride, sodium and calcium phosphates of the high standard of purity required for their use as aerating materials in the baking and milling trades, and amorphous phorphorus and magnesium and ammonium phosphates. They have also introduced several new lines, including tri-sodium phosphate of double strength, containing approximately 80 per cent. Na_3PO_4, as well as the ordinary commercial grade of this salt. This firm is also exhibiting a number of other preparations of a high degree of purity, including medicinal and 99.97 per cent. carbon tetrachloride, hypophosphites, glycerophosphates and precipitated sulphur. Silicon ester and preparations derived from this material, manufactured only by this firm, are shown in many forms. Special attention is drawn to silicon ester mortars which resist attack by ordinary acids, and their high compression strength is demonstrated in an interesting manner. Albright and Wilsons' products are now being sold through their London Office, Marlow House, London, E.C.3.

Bakelite, Ltd.

The exhibit at Stand No. D.52 in the Plastics Section emphasises the increasing use of Bakelite synthetic resin products with a comprehensive display of actual applications in a variety of industries. The exhibit comprises moulding materials, laminated sheets, tubes and rods, insulating varnish, lacquers and oil soluble resins and varnishes. New types of Bakelite moulding materials have been produced to give specific properties, such as high impact strengths, low dielectric losses, resistance to moisture, non-bleeding, non-blistering, etc. The use of these is broadening the field of applications for synthetic resin products and instances of novel application are being shown. Bakelite resins for the paint and varnish industry will receive special attention.

A. Boake, Roberts and Co., Ltd.

This display (Stand No. A.79) will be on much the same lines as last year, but there are many additions by means of which this firm is making efforts to show their appreciation of the continued support and encouragement given by home buyers, and to assist purchasers from abroad who are now endeavouring to obtain their supplies in this market. In fine chemicals, essential oils, terpeneless oils and intermediates, a varied range of products is being shown. Technical chemicals include liquid sulphur dioxide in glass syphons, tins and iron cylinders; sulphites, hyposulphites, bisulphites and metabisulphites; phosphates; saponines and sulphonated oils. Another group of products comprises solvents, plasticisers, gums and resins, as used in the preparation of cellulose nitrate and cellulose acetate lacquers, plastics and moulded products; also in the paint and varnish

trades and in printing inks. This firm has continued researches on the subject of special plasticisers and have added several new ones which are proving to be of importance in special instances. Metallic oleates, stearates, linoleates, tungates, palmitates and resinates are guaranteed to contain a definite metal content and can be supplied both in the fused and the precipitated form. Other parts of the exhibit cover flavouring essences, food colours and food preservatives; acetic acid of all grades and strengths; and carbon black, for which Boake Roberts and Co. are the sole distributing agents in the United Kingdom and Irish Free State for Shawinigan, Ltd.; pharmaceuticals, guaranteed to comply with all the requirements of the British Pharmacopœia and British Pharmaceutical Codex; and disinfectants, detergents and deodorisers. For the first time Boake Roberts and Co. will be showing a complete range of synthetic musks, including musk xylol, musk ambrette and musk ketone, each of which is a product of primary importance in the odours used in all toilet and cosmetic articles. The cellulose lacquers, paint and printing ink trades will find on this stand a most comprehensive range of solvents and plasticisers and ester gums.

British Industrial Solvents, Ltd.

All the products manufactured synthetically by British Industrial Solvents, Ltd., are derivatives of alcohol. An interesting chart is available on Stand No. A.16 showing the relationship which one product bears to another. It is the policy of this firm, wherever possible, to use raw materials of British manufacture. In a few cases where insufficient or no British supplies are available, they have to rely upon imports to meet their requirements. In practically every case, however, the products they offer are 100 per cent. British. At their works, which are at Hull and Carshalton, acetic acid, acetone, normal butyl alcohol and mixed esters being made in large quantities. Should the demand for any of the chemicals which they make increase, their plant could be easily and rapidly enlarged to meet the new conditions.

The British Xylonite Co., Ltd.

At Stand No. D.54b in the Plastic Section this firm is showing Xylonite, Bexoid (safety celluloid), and Lactoid (casein) materials in sheets, rods, and tubes; also Bex mouldings of all descriptions made from synthetic resins.

W. J. Bush and Co., Ltd.

An extraordinary range of products is being shown by this firm (Stand No. A.87). Fine chemicals include amyl cinnamic aldehyde, benzophenone, ionone (Alpha and Beta), geraniol and its esters, citronellol (Synthetic) and its esters, terpineol, linalyl, acetate, cream of tartar and aspirin, vanillin and coumarin and heliotropine. There are also flavourings, both natural and compounded, for all purposes; pure food colours; essential oils and their isolates; flower products, natural and compounded; and examples of benzoic acid, sodium bengoate, salicylic acid and sodium salicylate.

Gas Light and Coke Co.

Products being shown by the Gas Light and Coke Co. are derived from coal tar such as carbolic acid crystals (phenol) 39/40° C., 40/41° C., and detached crystals; carbolic acid liquefied crystals; creosote salts, drained, of 73½/75½° C. melting point; cresylic acid, marketed as 99/100 per cent. pale straw, naphthalene free, and also as 50 per cent. meta cresol and 50 per cent. ortho cresol; ferrous sulphate; green oil (anthracene oil); naphthalene of crystallising point minimum 79° C., supplied as ball, flake, powder and crystals; naphthalene in crude form, and best whizzed, cryst. pt. 77½/78° C., and No. 2 flake, cryst. pt. 77½/78½° C.; pyridine bases to all standard specifications, distilling 90 per cent. at 140° C., 90 per cent. at 160° C., 90 per cent. at 180° C.; pure pyridine, distilling 114/118° C.; and solvent naphtha, distilling 95 per cent. at 160° C.

General Chemical & Pharmaceutical Co.

The exhibits chosen by this firm (Stand No. A.40) are of particular interest and are representative of present normal production at the works at Sudbury. They include Judex laboratory chemicals and analytical reagents "A.R.," of which a very wide range is now manufactured, special reagents for the detection and determination of metals in low concentrations and various other chemicals of recent development. New "special reagents" include Magneson II, which by its greater sensitivity (some two and a half times that of the older reagent) and the fact that it may be employed for the colourimetric estimation of small amounts of magnesium is a definite advance on the original magneson. Nitrobruciquinone hydrate serves in almost every case as a specific reagent for the detection of small amounts of tin in the stannous state. The osazone of sodium dihydroxytartrate is a new precipitant for calcium particularly useful in the examination of water treated for industrial purposes from its additional capacity for precipitating magnesium. Iodobismuthic acid is a specific reagent for caesium and applicable to the separation of caesium from relatively large quantities of alkalies or alkaline-earth metals. Other products include Oasis accumulator acid, electrolyte for nickel-iron batteries, Vulcan dipping acid and other chemicals for electro-plating.

Hopkin and Williams, Ltd.

The exhibit at Stand No. A.78a draws special attention to this company's well-known brand of analytical reagents and to a book published by them giving specifications governing the purity of these reagents. This book describes not only the reagents for general analytical purposes, but also several special organic compounds, and a complete range of chemicals for the preparation of buffer solutions. The stringency of the tests demand a very high order of purity in these reagents, and their production constitutes a notable achievement of British fine chemical industry. Many organic compounds are finding application as reagents for the detection and determination of metals. These reagents enable analyses to be performed with ease and accuracy, which by the older chemical methods were troublesome and inexact. A number of interesting fine organic chemicals are also being shown, such as hippuric and malonic acids, 2 : 4-dinitro phenylhydrazine (reagent for carbonyl compounds), p-nitrocinnamic acid, ethyl p-nitrocinnamate, p-nitrobenzyl cyanide, and p-nitrophenylacetic acid. This firm specialises in chemicals for photographic plate, film and paper manufacture, and specimens of ammonium bromide and chrome alum of special grades for these purposes are exhibited. A collection of radio active uranium bearing minerals and uranium products should be of special interest to manufacturers of pottery and glass.

Howards and Sons, Ltd.

At Stand No. A.78 the exhibits include sodium salicylate in flaky crystals and in fine powder; bromides, which are now all-British, from British raw materials; ethers, iodides, mercurials, lactic acid, calcium lactate, calomel, isopropyl alcohol, bismuths, camphor, cinchona and quinine salts, epsom and glaubers salts, citrates, hydrogen peroxide, magnesias, menthol, thymol, etc. It may be of interest to the buyer of chemicals to know that Howards' bismuth salts have been made continuously since 1797; quinine since 1823. "Flodia," a recent product, is a new synthetic fixative already established as of great value in perfumery and the manufacture of toilet products and soaps; it is not, like other fixatives, merely selective, and does not cause discolouration in soaps. Phellandrene is a terpene from which impurities have been removed and possesses a remarkably refreshing pine odour; it is a valuable adjunct in the manufacture of shampoos,dental products, soaps, inhalants and spray solutions for disinfectants and perfumery purposes.

In the solvent section this firm is showing, besides the isopropcl alcohol mentioned above, a wide range of solvents for the textile, lacquer, rubber, leather, plastics and allied industries, such as ethyl lactate, diacetone alcohol (of special high flash point grade), cyclohexanone, and methycyclohexanone (Sextol) and its derivatives, cyclohexanone and methycyclohexanone (Sextone B), and esters, such as methylcyclohexanol acetate and methylcyclo-hexanol oxalate; the latter is now well established as a plasticiser under the trade name of Barkite. Two new plasticisers are being shown, namely, Sextol stearate, and Barkite B (dimethylcyclohexanol oxalate), both of which exhibit special properties. A new low boiling solvent acetal alcohol, is also on view. The solvent exhibits are illustrated by manufactured products kindly lent by some of the users of these solvents.

Johnson and Sons (Mfg. Chemists), Ltd.

At Stand No. A.58 a full range of photographic developers include amidol, metol, acid pyrogallic, hydroquinone, glycin, chlorquinol and azol. There is also an interesting display of silver nitrate for photographic sensitised material, as well as pharmaceutical preparations and gelenicals, including tinctures, extracts, emulsions, liniments, decoctions, etc. Another interesting exhibit comprises the various test papers which are manufactured by this firm.

Thomas Morson & Son, Ltd.

This firm is exhibiting a comprehensive selection of chemicals on Stand A.65. Those of pharmaceutical interest are bismuth and iodine preparations, also glycerophosphates and kreosote; cosmetic chemicals, "Osmo Kaolin" and stearates of zinc and magnesium; light sensitive iron salts, iron and ammonium citrate, green scales; and research and "A.R." chemicals.

Redferns Rubber Works, Ltd.

Firms requiring equipment used in handling acids and corrosive liquids will be interested in the display of Redfern Bulwark ebonite goods on Stand No. J.41. Ebonite is well-known as an efficient and economical material for curtailing the corrosive effects of various fluids; it is flexible, light in weight, easy to clean and handle, possesses appreciable tensile strength and will not absorb water. Bulwark ebonite embodies all these features. The equipment being shown includes pipes, bends, cross and tee pieces, taps, gland cocks, funnels, buckets, jugs, measures, tank linings and coverings for other metal work.

South Metropolitan Gas Co.

The products department of the South Metropolitan Gas Co. will be represented at Stand A.60, where many "Metro" coal tar and ammonia products resulting from the distillation of coal will be shown. Metro dry neutral sulphate of ammonia, premier nitrogenous fertiliser, is bone dry and acid free, and beautifully crystalline for ready and even distribution of the land for mass crop production. It contains as much as 25.71 per cent. of ammonia, which is equal to 21.14 per cent. of nitrogen. Metro disinfectant fluid is a high grade deodorising fluid for general service, flows freely at all temperature, mixes completely and easily with hard or soft, hot or cold, or even sea water in any proportion; a standard test proves it to be over four times more powerful in its germicidal action than pure carbolic acid. Metro wood preservative is prepared from specially selected creosote oils derived solely from coal gas tar, carefully blended to form an efficient wood preservative; it remains liquid and free from sediment at ordinary atmospheric temperatures. "Metrotect" is a careful blending of coal tar varnishes for the preservation of outdoor ironwork; when applied, a glossy black film of remarkable elasticity results, which is unmoved by vibration, is resistant to acid fumes, the attacks of heavy rains and violent atmospheric temperature changes. Other important products include motor benzole; anthracene; naphthalene, solvent naphtha, sharp oil, pyridine, sulphuric acid, sulphate of iron and coal tar pitch.

Spencer Chapman and Messel, Ltd.

This well-known firm (Stand No. A.35) is showing the acids for which it is famous, including oleum 20 per cent., 40 per cent., 60 per cent. and 80 per cent.; concentrated sulphuric acid, battery acid, hydrochloric acid and nitric acid of chemically pure grade. A feature is the wonderful specimen of sulphur trioxide crystals.

Thomas Tyrer and Co., Ltd.

At Stand No. A.59 there will be found a range of chemicals for the oil and paint trades, including aluminium stearate, zinc stearate, resinates, linoleates, cobalt and manganese salts; chemicals for the rubber trades, such as zinc sulphide, cadmium sulphide, etc; and chemicals for perfumery and cosmetic, including zinc stearate, magnesium stearate, etc. There is also a selection of various pharmaceuticals, including bismuth carbonate and other bismuth salts, hypophosphites, citrates, scale preparations, and analytical reagents.

Williams (Hounslow), Ltd.

As the oldest and largest manufacturers in Great Britain of nigrosines and indulines an important position will be given to the display of these products at Stand No. A.81. A complete range of dyestuffs soluble in water, methylated spirit, oils, turpentine, waxes, petroleum, etc., etc., is being exhibited to show the application of these dyestuffs many finished articles to which dyestuffs are applied will be exhibited. The very extensive field covered by this firm's activities includes such trades as leather, wicker and cane, printing ink, woodstains, lake makers and synthetic moulding powders. For years past the firm has devoted a laboratory and staff to the work of producing for customers their own particular shades and this service is placed unreservedly at the disposal of all their clients. Expert advice, based on the knowledge obtained during the past fifty-five years is freely given and any problems placed before them by users of dyestuffs will be gladly welcomed. The foodstuffs colours department of this firm is also being represented. Purity is the keynote of these special colours, which are manufactured under scientific control from the purest raw materials.

Miscellaneous

High Speed Steel Alloys, Ltd., Stand N. A.34, are exhibiting fine chemicals in the form of oxides and salts of tungsten, molybdenum and vanadium.

The Guelph Patent Cask Co., Ltd., are exhibiting Guelph casks in a variety of sizes and styles, on Stand No. DD.63.

The Aquamellis Engineering Co., Ltd., are showing a range of water softeners at Stand No. A.13, including two of their smaller industrial plants. These industrial models have been completely redesigned and are now arranged with all controls conveniently grouped together in front of the plant.

Solvent Products, Ltd., and the Carbon Dioxide Co., Ltd., are exhibiting jointly on Stand A.82. Among the articles of interest are a dry ice storage box for storing dry ice with the minimum amount of loss through sublimation, and the Cardice machine for producing small blocks of dry ice from liquid CO_2.

Scientific Instrument Section

The scientific instrument section at the British Industries Fair will again be situated in the Grand Hall at Olympia and will occupy approximately 14,500 sq. ft. of space, nearly 3,600 sq. ft. of which has been taken for a composite exhibit of British Scientific Instrument Manufacturers. The entire exhibit may be divided into two sections (a) technical instruments which will comprise the equipment required for control testing by works chemists, apparatus for laboratory research, and apparatus designed expressly for the teaching of science in colleges and schools, and (b) scientific instruments of a more or less domestic nature, such as barometers. Technical instruments will include thermometers for use in research and other work where it is essential for the nearest possible error to be known, and thermometers for calorific determinations which will read to the nearest 0.005° C.

One of the foremost British optical instrument manufacturers has, in collaboration with the British Photographic Research Association, evolved an entirely new form of photometer for the measurement of comparative densities of photographic plates and for the measurement of reflections from papers. This photometer utilises a photo-electric cell with a suitable amplifying system. The eye fatigues very rapidly when measurements of colour of density are undertaken and even an expert is unable to take more than ten or a dozen readings in one day and feel any confidence regarding the accuracy. Again owing to variations in light sensibility of individuals such measurements vary very widely. This instrument overcomes these difficulties and, further, enables readings to be taken by observers in different countries with assurance that they will always correspond.

Another remarkable instrument which will be exhibited is the Vickers projection microscope. This apparatus is entirely different from the conventional forms of microscope and is designed primarily for the use of metallographers, for study-

ing the structure of metals and other objects whether opaque or transparent. It will take speciments up to 50 lb. in weight and magnifications can be obtained from 3 to 5,000 diameters. In addition to visual observations the apparatus will also take micro-photographs, or, if desired, the image can be projected on to a screen for demonstration purposes.

The manufacture in this country of extremely delicate analytical balances for research chemists is a comparatively recent venture; up to a few years ago practically all analytical balances were of German manufacture. It is pleasing to be able to record that this country can now produce analytical balances equal, if not superior, to the foreign article in performance and workmanship and at competitive prices. An idea of the sensitivity of these balances may be gained by the fact that it is possible to weigh accurately a human eyelash, but in research work it is often necessary to weigh to even finer limits than this. Such accuracy necessarily entails great skill and precision in the construction of the balance. To overcome expansion and contraction due to changes of temperature the beam is made of an alloy which has a negligible co-efficient of expansion. This beam is pivoted on agate knife-edges which rest on agate planes. An example is the "Nivoc" analytical balance, a pattern which is greatly favoured in the laboratories of universities and by technical chemists. It is of simple design with little to get out of adjustment, but very much more elaborate balances are obtainable fitted with special devices to obviate the use of the very small fractional weights, to damp the swing of the beam by means of oil and pneumatic plungers thus allowing the balance to come quickly to rest, and microscope and optical arrangements to facilitate the reading of the very fine scale graduations.

Baird and Tatlock (London), Ltd.

Among the special exhibits at Stands Nos. A.101, A.114 and A.125, is a new gas-heated muffle furnace (Gas Light and Coke Company's registered design) intended for use at all temperatures up to 1,000° C. A range of new laboratory water taps which almost entirely eliminate the laborious cleaning usually required in order to keep the older types free from dirt and dust is another feature to be seen. Other exhibits include a range of standard ground joints for glass apparatus. In case of breakage it is unnecessary to return the broken apparatus for repair; all that is required in order to replace the broken portion is to specify the particular part which is damaged and the number of the joint. These joints, moreover, are interchangeable with the joints of other makers.

George Nobbs, Ltd.

Automatic temperature controls for electricity, gas, oil and steam for operating up to 1,000° C. are being displayed on Stand No. A.161. Instruments as supplied to furnaces, ovens, boilers, printing plates, incubators, etc., electric types being suitable up to 500 volts a.c. and d.c. and in conjunction with contactor switch suitable up to capacities of 100 amps.; they are also adjustable over a given range with sensitivity of 0.05° F. according to the requirements of the apparatus. The all-metal type of controls now incorporate snap and break magnetic action giving positive operation. They can be used at any angle and only require a small space for fixing.

Francis Shaw and Co. Ltd.

Hydraulic equipment suitable for the plastic moulding industry is being shown at Stand No. J. 14. The main items of interest are a 100 ton semi-automatic press, suitable for a working pressure of 1 ton per square inch. This press is complete with pre-filling tank, screw down valve, steam heated chests, etc.; a 150 ton up-stroke press, suitable for a working pressure of 1 ton per square inch, complete with gas heated platens, and valves; a 25 ton up-stroke press, having a working pressure of 1 ton per square inch with steam heated chests forming two daylights; patent automatic high and low pressure valve (this has not been exhibited in the British Industries Fair in London previously); cam-operated valve, suitable for operating a press similar to the semi-automatic press; a small high and low pressure hand pump, suitable for a working pressure of 1 ton per square inch; and the latest type of hand injection machine for cellulose acetate moulding.

Technology of the Platinum Metals

Development of New Uses

THE history of the platinum metals, their occurrence, metallurgy and uses, were dealt with by R. H. Atkinson in a paper read before the Swansea Local Section of the Institute of Metals, on February 14. Until early in this century the platinum metals were obtained almost exclusively from alluvial deposits of two types, platiniferous gravels and osmiridium sands, but from the commencement of nickel refining by the carbonyl process, using ore from the Sudbury district of Ontario, they were produced as by-products. With the rise of the nickel industry and the discovery of nickel ores containing higher P.M. values, the production of by-product platinum metals became a big factor in the platinum position and palladium became available in commercial quantities for the first time. The author gave a brief account of the metallurgical treatment of the Sudbury nickel ores, including operations at the Clydach plant of the Mond Nickel Co. in order to show how the precious metal concentrates are obtained. The extraction and refining of platinum metals from these concentrates is carried on at the company's Acton refinery.

Interesting points in connection with the history of the fashioning and uses of platinum were mentioned. For example, after being used for over a century for the purpose of concentrating pure acids, platinum was rapidly replaced by vitreosil. Fortunately for the industry a demand then arose for platinum in jewellery as the metal provides an ideal setting for precious stones. Throughout its history, as one use has disappeared for the metal, other uses have been discovered.

British Industries House

A Modern Trade Centre

THE London Life Association, Ltd., of 81 King William Street, London, E.C.4, has acquired the financial control of British Industries House, the new trade centre at Marble Arch, London. This important organisation, originated by Mr. W. J. Masefield, has already met with support from a large number of manufacturers and trade federations. Dominion and Colonial Governments, together with prominent City Development Councils, have also intimated their intention of participating in the project.

British Industries House, recently erected at Marble Arch for Gamages (West End) Stores, has a floor space of 5½ acres, with up-to-date equipment throughout the building, including twenty lifts, special cold storage facilities, and imposing window display covering a large area. Here will be housed, under one roof, a representative range of the lighter production of British and Empire manufacturers. Approximately, there will be from 500 to 600 manufacturers with showroom and show-case accommodation. Buyers from overseas, when they arrive in London, will find a trade centre from which they can carry out their business expeditiously. Advise on patents and inventions, market research, export markets, sales administration and publicity will be provided. A monthly magazine will be circulated to official and trade organisations, and also to buyers throughout the world. An attractive feature of the scheme is the Merchants' Club, which will occupy two floors of the building. Foreign buyers will, on arrival in this country, be made honorary members of the club.

Manufacture of Ammonium Nitrate

Details of New Process

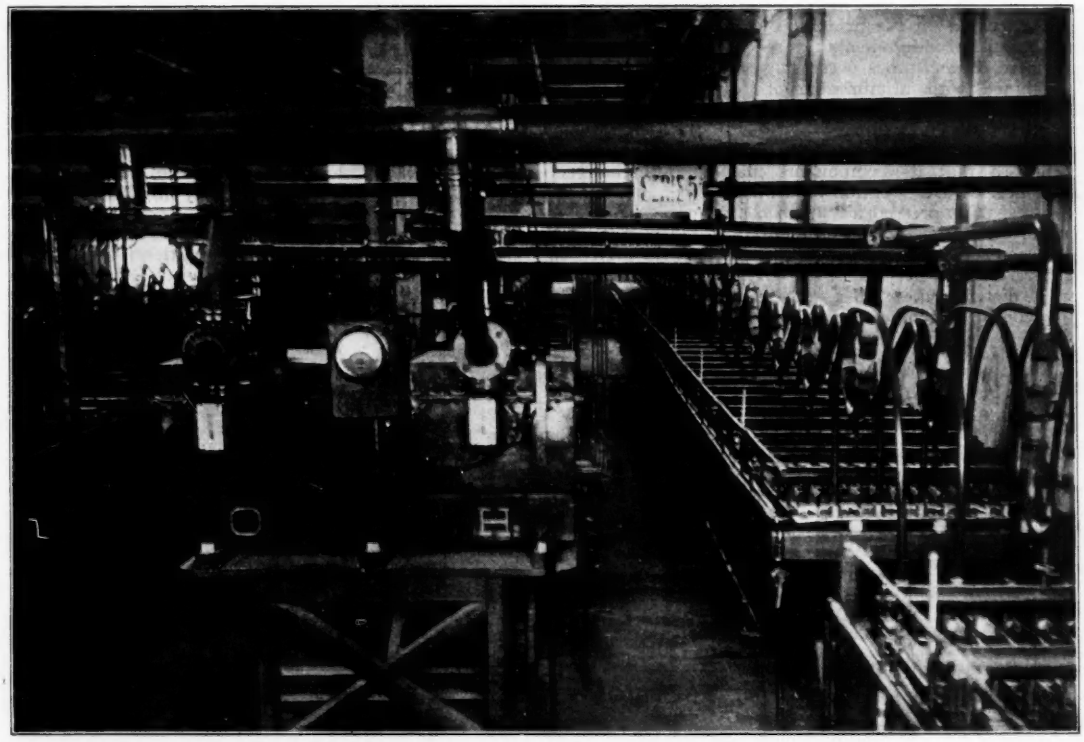
AN improved process involving neutralisation of nitric acid solution with ammonia in a closed vessel at 4 atmospheres pressure and 155° C., when the heat of reaction is used to evaporate the ammonium nitrate solution, is described by G. Fauser in "Industria Chimica," vol. 6, page 870. Preliminary passage of an air current drives out nitrogen oxides from the nitric acid, thus avoiding formation of ammonium nitrite which otherwise not only represents a source of nitrogen losses but is probably also responsible for explosions. The new process is hoped to lead to notable economies in production costs.

Works Equipment News

Modern Aids for the Chemical and Allied Trades

DURING the last year there has been a renewed demand for electrolytic hydrogen for oil hardening, and for this purpose the International Electrolytic Plant Co. have supplied numerous plants of the latest Knowles type. These plants have been installed in widely separated parts of the world such as India, Australia, Brazil and Turkey.

In this country, a battery to absorb 1,050 kW is now in course of erection which will be the third Knowles battery in the same oil works, bringing their total consumption up to 1,750 kW, with a production of over 13,000 cu. ft. of hydrogen per hour. A much larger plant to produce hydrogen for the manufacture of nitric acid, is under construction for Japan. This will comprise 540 cells operating at 10,000 amperes, with an output of over 87,000 cu. ft. of hydrogen per hour. In addition to the cells, the plant will be complete in all respects with automatic water feed tanks and washers, temperature control, electrically driven hydrogen boosters, and gas testing equipment. All these installations consist of cells with an efficiency of 4.65 kWh per cubic metre of hydrogen and the improved design occupies only one quarter of the floor space of the original type. The hydrogen is at least 99.9 per cent. pure and the oxygen 99.6 per cent.



Extension to an Electrolytic Hydrogen Plant at Bussi, Italy, comprising 50 cells operating at 6,000 amperes

The accompanying illustration is of a battery recently supplied to extend a plant at Bussi, Italy, and comprises 50 cells operating at 6,000 amperes. There are now 200 similar cells in this plant which has been extended on two occasions. A set of the latest pattern automatic water feed and gas washing tanks are in the foreground and these make the whole plant practically automatic in action. Loss of electrolyte is negligible as efficient spray separators are fitted to the cells and the last traces of electrolyte carried forward with the gases are returned to the cells from the washer tanks with the distilled water make-up.

A source of electrical loss in electrolytic plants has always been the high contact drop between the connections which slowly oxidise so that the loss becomes considerable as time goes on. The connections in Knowles cells, however, are now coated with nickel which is unaffected by atmospheric conditions or by the electrolyte, so that contact loss is negligible and there is no increase over very long periods.

An Improved Bituminous Paint

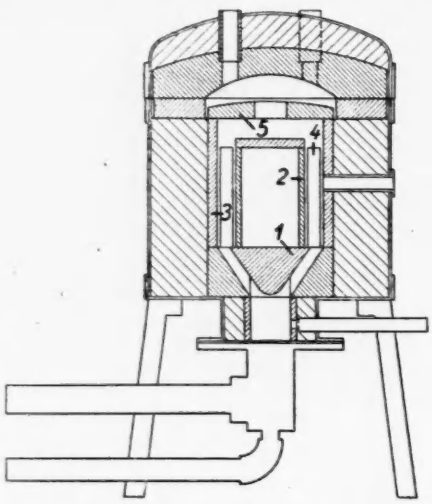
THE damage caused annually by corrosion amounts to many millions of pounds and whilst a good percentage of this is unavoidable it must be admitted that an enormous amount of damage thus caused could have been prevented if proper precautions had been taken. It is a failing in many of those who are responsible for the protection of iron or steel structures to employ inferior preservative solutions or even to ignore such remedies altogether until the presence of rust compels them to resort to some form of protection. The greatest care should be taken to specify a bituminous paint of well-known merit, as, although the preservative qualities of bitumens and asphalts are extremely efficient, these qualities may be rendered utterly void if insufficient care is exercised in the manufacture of the paint. Such preservatives as "Bitmarin" can be used with safety, but it must be remembered that there are still many solutions on the market which do not receive the necessary close technical control which will ensure the proper efficiency of the material.

The application of a bituminous paint is also a matter which requires care and experience. The process is a simple one, but due regard must be taken to see that the surface to be painted is dry and reasonably clean and for this purpose a stiff wire brush should be used prior to the application of the coat. If the metal work has already been attacked by rust a good bituminous solution will prevent further damage, but it is essential that the metal work should be well scaled prior to painting so that the bitumen may form a film over the metal itself and not over the layer of rust. The solution is applied with an ordinary paint brush and an even film should be aimed at; which, by reason of its sealing and pores of the material on which it is applied, should be capable of

withstanding damp, corrosion arising from acid fumes, salt water and other causes of deterioration. Some idea of the covering capacity of these solutions may be of interest. Using "Bitmarin" the covering capacity on metal is 35 sq. yd. per gal.; for brickwork, 15 sq. yd. per gal.; for concrete, 10 to 15 sq. yd. per gal. Such bituminous solutions are now supplied in various colours, which considerably widens the field of application of these materials. At present the colours, although bright enough for most purposes, cannot be produced in such ranges as are obtainable in ordinary lead paints. As is well known, bitumen is one of the blackest materials in the world and to convert it to a very bright hue would mean the addition of pigment in quantities which would seriously upset the technical laws governing the manufacture of a first-class bituminous solution. These paints have, therefore, been produced in colours without the loss of any appreciable percentage of bitumen, which alone is responsible for their excellent performance in rust prevention.

A New High Temperature Furnace

THE "Lilliput" gas-heated high temperature furnace has been introduced to meet the requirements of those who only make relatively small melting or firing tests, etc. It is mainly constructed on the principles employed in the well-known "Degussa" high temperature furnaces, *i.e.*, surface combustion in contact-tubes possessing a highly reactive surface, combined with a minimum of resistance inside the furnace and symmetrical distribution of flame and insulation material, in order to obtain favourable thermic conditions. Heating is effected by means of a blast-burner, accurately constructed so that its components may be interchanged. Three air nozzles are supplied of different sizes for various air pressures. Compressed air up to 5 atm. can be used, or alternatively air from a low pressure fan at 200—500 mm. water pressure. The gas-air mixture is efficiently mixed in the burner, from which it issues already ignited, and is uniformly distributed against the cone-shaped baffle (1) attaining complete combustion when it has passed through



Degussa "Lilliput" Gas-heated Laboratory Furnace

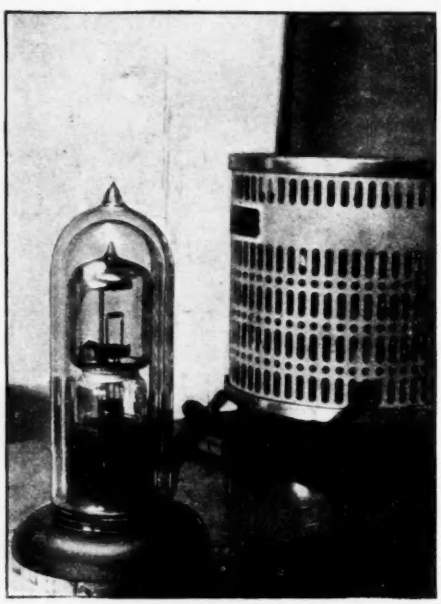
the contact tubes (4) into the ring-shaped space between the mould (2) and lining (3). Combustion is practically finished at the upper ends of the small contact tubes, and after passing an inner lid (5) the gases given off pass through three holes in the furnace cover into the open air. The ceramic portions of the furnace consist of high grade corundum and magnesia, and are so constructed that a replacement of the whole of the inside arrangements can take place in a few minutes. The furnace can conveniently stand on a laboratory table and gives out less heat than a blast burner. Connection with a chimney is not necessary; installation is effected by simply connecting the furnace to the gas and compressed air system by rubber tubing.

With this laboratory furnace, according to information supplied by Bush, Beach and Gent, Ltd., high temperatures of 1,580° C. can be reached with certainty. Conditions being favourable, a maximum temperature of 1,900° C. can be reached, assuming the use of a normal lighting gas of about 425 B.Th.U. per cu. ft. at a pressure of 100 mm. water column. If very low air pressure (100—500 mm. water column) is used, the maximum temperature obtained is around 1,750° C. The consumption of gas amounts to about the same as that of an ordinary laboratory blast-burner, say 3 cu. m. per hour, when the maximum temperature is to be attained. In the case of lower temperatures, the consumption is correspondingly less and about equals that of a powerful Teclu burner. The cross section of the gas and air supply and tubing should not be less than ½ in. The time required for heating up the maximum temperature is about 15-20 minutes. The cylindrical working space of the furnace has a diameter of 44 mm. and a height of 75 mm.

Because this furnace possesses such a great temperature range it is of universal application in general laboratory analysis and in testing and research institutes. Reactions requiring a great degree of heat previously effected with considerable difficulty and perhaps incompletely with the usual blast furnace, can be carried out in a fraction of the time hitherto required. Moreover, a feature of great importance is the ability to work an oxidising, reducing, or neutral atmosphere as desired. If necessary, the furnace can be made with an opening for the introduction of a central gas pipe.

A Sodium Lamp for Colorimetry

A SIMPLE form of lamp in which a glow discharge takes place in sodium vapour has been introduced by the firm of Philips Industrial. The intensity is very high and the radiation practically monochromatic. The principal radiation is from the yellow sodium doublet. Other radiations together have less than 1 per cent. of the strength of the yellow sodium lines. If so desired, some very weak green and blue lines



Philips Sodium Lamp for Laboratory Use

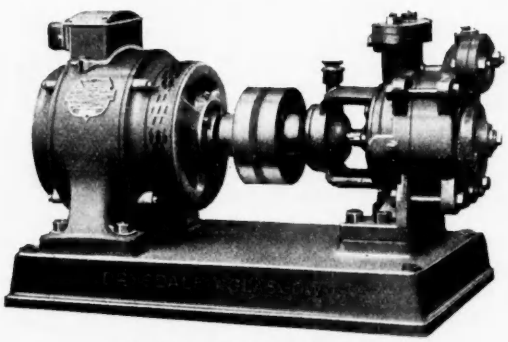
can be filtered away by either a photographic yellow filter or by a potassium-bichromate cell. To operate the lamp (215-230 a.c. only) a Philips rectifier is used. This rectifier supplies heating current to the filament, and also provides the necessary voltage for the glow discharge. The lamp is connected to the valve plug of the rectifier by means of a 4-core lead with a 4-pin plug. The primary of the rectifier is directly connected to the mains. To start the discharge, it is only necessary to close the primary circuit of the rectifier by connecting it to the A.C. mains. The Dewar flask is placed over the lamp, and ensures an even, steady working temperature. The lamp reaches full brightness in about 10 minutes

after switching on. Applications will be found for this lamp in photometric comparisons in colorimetric, chemical analysis involving determination of the rotation of the plane of polarisation and numerous other applications in which a highly intense monochromatic source is needed.

A New Self-Priming Centrifugal Pump

DRYSDALE and Co., Ltd., the well-known makers of centrifugal pumps, have recently put on the market a novel design in centrifugal pump of the self-priming type, which appears to offer considerable advantages over the ordinary reciprocating pump so much in use at the present time. This pump, known as the "Wee-Mac," works on an entirely new principle. The impeller is a plain disc with a number of blades arranged round the periphery, and rotates inside a concentric casing having a wedged-shaped passage on each side of the impeller. The wedge-shaped passage on one side gradually decreases in area from the suction opening where it is a maximum, while on the other side an opposite handed passage gradually widens until the discharge opening is reached. The water circulates in each of the blades itself where it is given an impulse. The discharge into the pipe passages is taken up by the next cell and so on until the discharge orifice is reached. A compound pumping effect is therefore obtained, which enables this unique pump to deliver at approximately three times the pressure of an ordinary centrifugal pump of the same proportions.

The "Wee-Mac" patent pump has another extremely valuable feature in that it is self-priming. It can not only fill an empty suction pipe but can deal with air locks due to loops or rising in the suction pipes without the slightest difficulty. Tests have proved the pump capable of working



The "Wee Mac" Centrifugal Pump

with a suction lift of 28 ft. It is made in several different arrangements, *e.g.*, with direct coupled electric motor, with belt drive, and with direct coupled oil engine either for stationary or portable use. Various sizes, from 120 gal. per hour to 3,000 gal. per hour, and for pressures up to 150 lb. per sq. in. (equivalent to 346 feet ahead) can be supplied. The upkeep of this pump is claimed to be negligible, and the space taken up is small.

An Improved Centrifugal

DIRECT electrically-driven centrifugals, made by Thomas Broadbent and Sons, Ltd., are of exceptionally robust construction to withstand severe working conditions, and to give many years of continuous service with a minimum cost in maintenance. Massive framework, large-size ball and roller bearings, improved housing for buffer, quick-action brake, large capacity basket of special fabrication, heavy duty motor giving extra rapid and smooth acceleration, and many other outstanding features, have created a world-wide demand for "Broadbent" machines. Users of centrifugals realise the great importance of installing machines of proved reliability, otherwise frequent and costly breakdowns are almost certain to occur. The initial cost of a high grade centrifugal is secondary in importance to reliability and long service. The accompanying illustration shows an improved type of direct electrically-driven centrifugal of the over-driven type, suitable for centrifuging a great variety of crystalline or granular products. The basket can be built from various metals or alloys, and has a central bottom discharge to permit the centrifugal material to be dropped out below the machine. For A.C. supply the motor is of very special design, and constructed to give ultra-rapid and smooth acceleration, and is direct coupled by means of a spline coupling without clutch. The machine is very quickly up to full speed, and,

The Broadbent Direct Electrically Driven Centrifugal

consequently, gives considerably increased output. For D.C. supply, a heavy duty traction type motor is used, and coupled by means of an automatic clutch. The patented method of mounting the motor considerably reduces oscillation of the basket during the accelerating period.

Glycerine from Sugar

Comparison of American and German Processes

A CONSIDERABLE amount of research work is in progress on the fermentation of sugar to glycerine, representing a continuation of the American and German work of the war period, which in its turn was based upon the pioneer investigations of Neuberg. Both the American and German processes were successful to the extent of securing an approximately 20 per cent. conversion of saccharose or glucose into glycerine, but whereas the former utilised the variety of yeast known as *Saccharomyces ellipsoideus* in a medium rendered alkaline with sodium carbonate, German practice involved the use of *Saccharomyces cerevisiae* in the presence of sodium sulphite. Extraordinarily complex as are the factors involved in any fermentation process, it appears to be well established in the present case that sodium ions are essential. Much work remains to be done, however, with regard to selecting a salt of sodium of optimum efficiency. Attention may be directed for example to an account of the researches of Mario Giordani in "Giornali di Chimica industriale ed applicata," December, 1932 (pp. 597-600), from which it is encouraging to note that a relatively high concentration of sodium sulphate resulted in a 25 per cent. conversion of glucose into glycerine.

Slander Action Fails

Solidal Chemicals, Ltd. v. Lysol, Ltd., and Black

In the King's Bench Division, on February 8, 9 and 10, Mr. Justice Avory and a common jury had before them an action by Solidal Chemical, Ltd., of the Borough, S.E., against Lysol, Ltd., of Raynes Park, and Mr. A. J. Black, their secretary.

As against the first named defendants, the plaintiffs claimed damages for slander, for falsely and maliciously and without reasonable and probable cause presenting a petition for the winding up of the plaintiff company. As against Mr. Black plaintiffs alleged that he had slandered the company.

Defendants denied the slander and said they had reasonable grounds for presenting the petition, that the alleged slander was published on a privileged occasion, without malice and was true in substance and in fact. They counterclaimed for payment of £102, being the amount of their costs in certain trade work proceeding in South Africa.

Mr. Pratt, K.C., and Mr. Slade, appeared for the plaintiffs, and Sir Patrick Hastings, K.C., and Mr. Robertson represented the defendants.

Both companies are the manufacturers of preparations of Lysol, the patent of which had expired, and they were in keen competition in various parts of the world. Plaintiffs made various kinds of solid lysol and they had their trade marks. The present dispute arose out of an application by the defendants to register in South Africa the trade mark Lysolvent. This was opposed by the plaintiffs, who were ordered to give security for the costs, which were taxed at £102. No steps were taken to collect the money in South Africa. Plaintiffs were perfectly well able to pay the money and ten times the amount. Plaintiffs took the view that they ought not to pay and that the proper course was for the defendants to claim to recover the sum. Instead of that the defendants brought a petition to compulsory winding-up of the plaintiff company, which was duly advertised. When the petition was heard it was opposed and adjourned, and ultimately dismissed by Mr. Justice Maugham.

Plaintiffs' case was that the petition ought not to have been brought and that its object was to crush the plaintiff company.

With regard to the defendant Black it was alleged that, in a telephone conversation to Sir Christopher Robinson, of the associated market services, who was making inquiries about the petition, he said the matter was still sub judice, and he could not give any information. Plaintiffs said when that statement was made the petition had been dismissed, in other words, said counsel, he deliberately represented that the petition was still pending.

Sir Patrick Hastings, for the defendants, said the main part of the action was the allegation by plaintiffs that defendants had maliciously launched a petition to wind up the plaintiff company. His clients, through their solicitors, had applied for the payment of the £102, but received an impertinent reply. The defendants then left the matter in the hands of their solicitors and agreed to the suggestion that a petition should be presented against the plaintiff company. The usual notices as to payment were given the plaintiffs, and the petition presented. Under the circumstances he submitted that the petition was presented with reasonable and probable cause. He contended that in the circumstances there was no malice on the part of the defendants.

On Friday, February 10, his lordship addressed the jury and put to them questions, which they answered as follows:—

(1) Was the defendant company actuated by malice in presenting the petition for the compulsory winding-up of the plaintiff company?—No.

(2) If so, what damages should be awarded?—Nil.

(3) Did the defendant company, or Black, as secretary, speak and publish to Sir Christopher Robinson the words complained of?—No.

(4) Was the defendant Black or the defendant company, on whose behalf he was supposed to be speaking, actuated by malice?—No.

(5) If the plaintiff company are entitled to damages, what sum do you award?—None.

His lordship, on the jury's findings, entered judgment for the defendant company with costs.

On the counter-claim of the defendants for £102, his lordship gave judgment for the defendants with costs.

Institute of Metals

Twenty-fifth Annual General Meeting

The twenty-fifth annual general meeting of the Institute of Metals to be held on March 8 and 9, at the Institution of Mechanical Engineers, London, under the chairmanship of the president, Sir Henry Fowler, D.Sc.

The meeting will begin at 10 a.m. on Wednesday, March 8, with the presentation of the report of Council for 1932 and the announcement of the results of the election of officers for the year 1933-34. At this session the following papers will be presented for discussion:—"Some Effects of the Addition of Tellurium to Lead" (W. Singleton and B. Jones); "The Interpretation of the Tensile Test, with Reference to Lead Alloys" (Professor B. P. Haigh, D.Sc., and B. Jones); "Experiments on the Effects of Variations in Mould and Pouring Temperatures on the Macro- and Micro-Structures of Some Low Melting-Point Metals and Alloys" (Francis D. Weaver, B.Sc.); "The Physical Properties of Zinc at Various Stages of Cold-Rolling" (R. Chadwick).

Members will lunch together at St. Ermin's Restaurant, re-assembling at 2 p.m. to reconsideration of the following papers:—"The Fatigue-Resisting Properties of Light Aluminium Alloys at Elevated Temperatures" (J. W. Cuthbertson, M.Sc.); "The Electrical Conductivity of Aluminium Wire" (A. J. Field, B.Sc., and J. H. Dickin, B.Sc.); "Graphitic Silicon, Heat-Treatment, and the Electrical Conductivity of Aluminium" (L. H. Callendar, A.R.C.S., F.I.C.); "An X-Ray Investigation of the Copper-Aluminium Alloys" (A. J. Bradley, Ph.D., and Phyllis Jones, Ph.D.).

Annual Dinner and Dance

The afternoon session will adjourn at 4.30 p.m., but at 7 p.m. members will assemble at the Trocadero Restaurant, Piccadilly Circus, for the Institute's annual dinner and dance. Among those who have accepted the invitation of the Council to be the guests of the Institute at the dinner are:—Sir William Bragg (Royal Institution); Sir Hugo Hirst (Institute of Fuel); Sir F. Gowland Hopkins (Royal Society); Sir Joseph Petavel (National Physical Laboratory); Sir Charles Grant Robertson (University of Birmingham); and Dr. S. W. Smith (Institution of Mining and Metallurgy).

Re-assembling at 10.30 a.m. on Thursday, March 9, members will hear the presentation and discussion of the following papers:—"The Distribution of Porosity in Copper Ingots" (N. P. Allen); "The Equilibrium of the Reaction between Steam and Molten Copper" (N. P. Allen and T. Hewitt, M.Sc.); "An Investigation of the Effects of Hydrogen and Oxygen on the Unsoundness of the Copper-Nickel Alloys" (N. P. Allen and A. C. Street, B.Sc.); "Note on the Influence of Volatile Chlorides on Magnesium and on Copper" (J. D. Grogan and T. H. Schofield, M.Sc.); "The Application of the Diamond Pyramid Indentation Test to Copper and Copper-Rich Alloys in the Form of Thin Strip" (Mr. Cook, M.Sc., and E. C. Larke).

The general meeting will conclude at 1 p.m., being followed by luncheon at St. Ermin's. Thursday afternoon will then be devoted to a visit to the headquarters of the British Non-Ferrous Metals Research Association, the laboratories of which will be open for inspection. Here exhibits will be on view to illustrate the progress and results of a number of the researches carried out for the Association in government and university laboratories, as well as in its own headquarters. This visit is restricted to members of the Institute, but visitors will be admitted to the meetings for the reading and discussion of papers on presentation of tickets to be secured on application to the secretary of the Institute of Metals, Mr. G. Shaw Scott, 36 Victoria Street, S.W.1.

Silver Jubilee Autumn Meeting

The Council of the Institute has accepted an invitation from the committee of the Birmingham local section to hold the Silver Jubilee meeting in Birmingham from Monday, September 18, to Thursday, September 21.

The annual May lecture will be held on May 10, when Monsieur Albert M. Portevin, the distinguished French engineer, president of the Société des Ingénieurs Civils de France, will speak upon "Quenching and Tempering Phenomena in Alloys."

News from the Allied Industries

Mineral Oil

FIRE FOLLOWED THE EXPLOSION of an oil drum at the Asiatic Petroleum Co.'s North Point installation at Hong Kong, last week, and rapidly assumed proportions that threatened the entire plant. After an hour's work, the flames were put under control.

Non-Ferrous Metals

THE CONFERENCE OF ZINC PRODUCERS at present meeting in Brussels, at which the British, Canadian, Australian and Mexican producers are the chief interests represented, has decided to propose to the various groups the continuation of the existing zinc cartel as from February 1. The groups are required to reply to the proposal before the end of this month.

A SPECIAL GENERAL MEETING of the International Nickel Co. of Canada is to be held on March 28 for the purpose of sanctioning and confirming by-laws for reducing the capital by cancelling 167 shares of preferred stock of $100 and 14,454 shares of common stock without par value surrendered for cancellation since December 13, 1929; and for increasing the authorised capital by the amount of such reduction by 167 shares of preferred stock of $100 and 14,454 shares of common stock without par value.

Iron and Steel

A PROVISIONAL AGREEMENT has been reached at Brussels by the delegates of the Continental steel producers to renew the cartel for a period of five years. As a basis for the respective quotas, the Belgians finally agreed to the results of the first six months of 1932. One delegate, however, representing the Forges de Clabecq, with three blast-furnaces, refused to come into line, and the signing of the final agreement has been postponed until this difficulty has been overcome. It is believed that prospects for a final agreement are favourable.

AN UP-TO-DATE BLAST FURNACE is to be set up by Dorman Long and Co. at their Cleveland works, near Middlesbrough, in which they will embody the result of extensive investigations, which they have carried out with a view to finding the most economical modern unit. The blast-furnace, which is mechanically charged and capable of producing 400 tons a day, is designed to deal particularly with Cleveland ironstone from the company's own mines. They have already in operation at the works two skip hoist mechanically-charged furnaces, with an output of 200 tons a day.

Artificial Silk

WORLD RAYON OUTPUT is estimated in 1932 at 505,000,000 lb., as against 471,000,000 lb. in the previous year. Of this amount, Britain produced 72,500,000 lb., against 54,600,000 lb. in 1931. Among other increases were Japan with an estimated output of 64,400,000 lb., against 46,800,000 lb. in the previous year, France at 47,300,000 lb., against 36,400,000 lb., and also Canada, Czechoslovakia, Germany, Poland, Spain and Switzerland. On the other hand, a decreased production is estimated for the United States, the figure being 131,100,000 lb., against 140,800,000 lb. in 1931. Other countries to show decreases were Belgium, Holland and Sweden.

UNDER THE COMPULSORY LIQUIDATION of Atlas Artificial Silk Processes, the statutory first meetings of the creditors and shareholders were held in London, before Mr. H. P. Naunton, Assistant Official Receiver, on February 8. The chairman said that the company's liabilities amounted to £117,446, of which £20,704 was due to unsecured creditors, and as the assets, valued at £22,500, would be absorbed in the Debenture claims, there was no prospect of any dividend for the unsecured creditors, or of any return to the shareholders. The assets included unpaid calls £294,189, estimated to produce only £1,412. The failure of the company was attributed by Mr. George MacElwee to (a) the inability of the three largest shareholders to meet the calls due on their shares; (b) that more money than was originally anticipated by Mr. Brandwood had to be expended in bringing the process and plant to commercial production; (c) the large fixed Excise duty payable on products; and (d) the low prices prevailing during the period of production. The liquidation was left in the hands of the Official Receiver.

China Clay

DURING THE VISIT OF H.R.H. THE PRINCE OF WALES to the Duchy of Cornwall, he made a surprise visit to one of the china clay works and spent a most interesting time in observing the process of china clay production. The works of the Carpalia United China Clay Co., of which Spicers Brothers are owners, were the works chosen, but unfortunately the resident manager was prevented from welcoming the Prince through influenza and was ordered to bed just an hour before their arrival. However the Prince had quite an instructive account of the whole process from the pit to its complete preparation for shipment.

The Trade Mark "Yeast-Vite"

Appeal for Judgment on Alleged Infringement

IN the Court of Appeal on Wednesday, Lords Justices Lawrence and Romer had before them an appeal by Irvings' Yeast-Vite from an order of Mr. Justice Bennett sitting in the Chancery Division in favour of Mr. Frederick Alexander Horsenail, in refusing plaintiffs an interim injunction restraining an alleged infringement of trade mark. Defendant sold tablets and on a label on the bottle he put the words "These tablets a substitute for Yeast-Vite," Mr. Justice Bennett held that on a fair interpretation of the label he could not say that the defendant indicated his goods as of those of the plaintiffs, and he refused an injunction restraining infringement.

Sir Leslie Scott, K.C., appeared for the appellants.

Defendant did not appear.

A Pure Question of Law

Sir Leslie Scott said Mr. Justice Bennett said he was bound by the decision in the bullock cart trade mark in the Port Wine case and in the leather belting case. The appeal was a pure question of law as to whether the user of the plaintiffs' trade mark in the way indicated by the defendant, was an infringement of plaintiffs' trade mark.

There had been an injunction granted restraining passing off by the defendant.

Lord Justice Romer pointed out that the Court of Appeal had, in a case which came before the Court on an appeal from himself, when sitting in the Chancery Division, laid it down that he was wrong in thinking that there could not be an infringement of trade mark unless what the defendant did indicated origin.

Sir Leslie said that was his case.

Mr. Trevor Watson, K.C., who appeared with Sir Leslie, supported his learned leader's arguments.

The Court held that the appeal failed and dismissed it.

Lord Justice Lawrence said the case was indistinguishable from the port wine case, though the facts were different. In his opinion the defendant had not used the mark as a trade mark.

Lord Justice Romer concurred.

High-Grade Oil Discovery in Ontario

FROM Chatham, Ontario, it is reported that high-grade oil has been secured from a new deep well drilled for natural gas in Raleigh Township, Kent County. One hundred and sixty quarts of nitro-glycerine were used in shooting the well which had been drilled to a depth of 1,600 ft. The oil flow has been reckoned at approximately 50 barrels daily, rating 56 per cent. gravity, free from sulphur, and is considered equal to that of the Pennsylvania field in the United States. For a brief period the well is reported to have poured out oil at the rate of 100 barrels a day. The gas flow, previously 300,000 cu. ft. was increased to 500,000 cu. ft. daily, according to first reports. Oil from the new well has now been delivered at the refinery of Imperial Oil, Ltd., at Sarnia, and is stated to be 48 to 49 degrees gravity. The second well is now being drilled three-quarters of a mile from the first discovery.

Chemical Notes from Overseas

Hungarian Production of Zinc Oxide

TWO concerns are producing zinc oxide in Hungary, one being the Smelting A.-G. and the Metallhandels A.-G., each having an annual capacity of about 1,500 tons. Consumption of zinc oxide in Hungary declined from 1,000 tons in 1930 to 500 tons in 1931. The exports of the pigment are restricted and both plants were obliged to reduce their output.

Exports of Turpentine and Resin from Spain

TOTAL exports of turpentine and rosin from Spain during the first ten months of 1932 suffered a decline. Turpentine shipments amounted to 167,818 gallons, as compared with 215,047 gallons for the same period of 1931. Italy was the largest purchaser with Belgium and France following. Rosin shipments for the period totalled 1,321 metric tons which quantity represented a loss of 193 metric tons over the corresponding period of 1931. Great Britain, Germany, and Belgium were the largest buyers.

Synthetic Resin Production in Poland

PARTLY as a result of increasing demand, but chiefly because of the request of the Polish Government, the Fabryka Kabli (Cable Manufacturing Plant) of Krakow, recently started the production of a phenol-formaldehyde type of synthetic resin. Present domestic requirements are said to be about 150 to 200 metric tons annually, but it is intimated in profession quarters that this amount will increase rapidly because of its proposed use for insulations, and electro-technical purposes, for which the Government will place considerable orders. Imports will be gradually eliminated.

German Synthetic Wax Development

THE commercial manufacture in Germany of certain higher alcohols from high molecular fatty acids has been made possible by a recent German invention. These alcohols exhibit the well-known characteristics of ascending series their boiling point, specific weight, hardness, etc., increasing with the increase in molecular weight. Similar to the paraffin series they exhibit a whole graduation of physical consistency, from volatile liquids through heavy liquids, soft waxes and hard waxes. Mixtures of these alcohols are produced by a firm in Rodleben under the trade name of "Lanette Wax." They are said to find application in the textile and leather industries and in the manufacture of soaps and cosmetics.

Essential Oil Situation in France

EXPORTS of perfume oils from Nice, France, a principal export distributing centre for French oils, to the United States during the first nine months of 1932 totalled approximately £70,000 in value as against £100,000 and £160,000 in the similar periods of 1931 and 1930, respectively. Exports of Grasse essential oils, which have represented as much as 75 per cent. of the total output in recent years have been especially hard hit by a virtual cessation of the German demand and considerably lowered imports by the United States. Producers were encouraged in October and November, however, by numerous inquiries and several good orders from the United States. Generally speaking, prices for these oils have declined from between 30 and 40 per cent., excepting Geranium oil, for which prices have held firm.

Hydrogen Peroxide Production in Germany

ALTHOUGH Germany has an annual production capacity of about 8,000 metric tons of hydrogen peroxide, it is roughly estimated that only about 3,000 tons were produced in 1932, all but 5 to 7 per cent. of this output is by the electrolytic process through potassium or ammonia persulphates. The remainder is by the barium peroxide process. Increasing supplies of electrolytic hydrogen peroxide of 30 to 60 per cent. strength tending to displace chlorine in textile bleaching and introduce peroxide for a large variety of uses including the bleaching of silk, wool, furs, fats, horn, rare woods, hair, and tobacco. Hydrogen peroxide compounds with urea are marketed under trade names such as Ortizon, Pergonol, Hyperol and Perhydrit. German peroxygen compounds foreign trade is grouped with bleaching powder and the quantities of individual products are not known.

German Exports of Arsenates

THE exports of arsenates from Germany amounted to 4,425 metric tons in 1931 as compared with 2,578 tons in 1929. It is estimated that the German production of arsenates ranges from 8,000 to 10,000 tons and that calcium arsenate accounts for about three-fourths of the total. Approximately 4,500 tons of arsenic is produced annually in Germany from domestic and imported ores. At least 15 German firms are engaged in the manufacture of arsenic compounds.

Potassium Sulphate in Belgium

THE Produits Chimiques de Tessenderloo was formerly the only manufacturer of sulphate of potash in Belgium. This company later participated in the formation of a new company, the Produits Chimiques du Limbourg, which took over the manufacture of sulphate of potash. The Produits Chimiques de Tessenderloo have since limited its activity to the manufacture of sulphate of soda, hydrochloric and sulphuric acids, and chemical fertilisers.

Copper Chloride Fungicide in Italy

THE Sociéta Elettrica de Elettrochimica del Caffaro, an important Italian producer of electro-chemicals, became interested many years ago in copper chloride as a fungicide utilising surplus chlorine. Its product, marketed under the name of "Caffaro Powder," has a copper content of 16.5 per cent. and is reported to sell at from 10 to 15 per cent. less than copper sulphate. Manufacturers claim it has certain advantages over copper sulphate and report that 1931 production was approximately 6,500 metric tons, of which 85 per cent. entered into domestic consumption.

Italian Research on Beryllium

ON the occasion of the tenth anniversary of the foundation of the Fascist régime in Italy, four prizes for chemistry have been founded. These prizes were awarded during the Congress of Science, held at Rome. Among the winners is Dr. L. Usoni, who was awarded a prize for his research on rock containing beryllium, research which has resulted, for example, in increased efficiency in the technique for the extraction of this important metal. Dr. Usoni's method of extraction is by flotation. By using 100 grams of sodium oleate, 150 grams of pine oil, and 50 grams of lead nitrate per ton of the mineral, the glucinium separates out and floats, while the quartz falls to the bottom.

Fertilisers in Mexico

THE Mexican market for fertilisers is developing slowly. One of the large German industrial chemical importers maintains a very efficient agricultural development department and has imported high analysis materials for direct re-sale or for mixing purposes. While sales are reported to be progressing satisfactorily the cost of distribution is unusually high due to the limited consumption. At the present time the Mexican planters find it very difficult to obtain credit and even though they appreciate the importance of fertilisers they have been forced to restrict their purchases. One of the most important cane planters formerly utilised fertilisers at the rate of 100 kilos of N, 110 to 120 kilos of P_2O_5, and 30 kilos of K_2O to the hectare, but at present is using less than half of the amount mentioned.

Yugoslav Chemical Imports Excel Exports

THE Yugoslav chemical industry throughout 1932 was faced with a continuance of the decline in export demand. Until 1930, Yugoslavia was more an exporter than an importer of chemicals and allied products, but in that year imports of chemicals attained a value of around £1,400,000 and exports only £1,100,000. More recent figures are not available. Fertiliser stocks in 1932, particularly superphosphates, accumulated at the plants, and the farmer could not be induced to take them even on liberal terms. In nearly all branches of the heavy chemical industry, retrenchments were necessary. Other chemical products, notably essential oils, had to forego justifiable expansion and rationalisation because of the lack of adequate financing.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF RHODAMINE DYES. E. I. Du Pont de Nemours and Co., and O. Allemann. Feb. 9. 4018.

ALUMINIUM BASE ALLOYS. Aluminium, Ltd. Feb. 6. (United States, April 21, '32.) 3569 and (United States, April 21, '32. 3570 (cognate with 3569).

CRYSTALLISATION OF SUBSTANCES THAT CRYSTALLISE EXOTHERMICALLY. Appareils et Evaporateurs Kestner. Feb. 6. (France, Feb. 5, '32.) 3585, and (France, March 23, '32.) 3586 (cognate with 3585).

ELECTROSTATIC PURIFICATION OF GASES. J. J. V. Armstrong (*Research Corporation*). Feb. 10. 4082.

PURIFICATION OF COPPER. British Non-Ferrous Metals Research Association. Feb. 8. 3842.

PAINT TINS, ETC. British Paint and Lacquer Co., Ltd. Feb. 11. 4218.

MAKING REACTION PRODUCTS OF KETENE. Carbide and Carbon Chemicals Corporation. Feb. 7. (United States, Feb. 16, '32.) 3785.

REDUCTION OF FATS, OILS, ETC. Deutsche Hydrierwerke Akt.-Ges. Feb. 10. (Germany, Feb. 22, '32.) 4165.

PRODUCTION OF CORROSION-RESISTANT IRON ALLOYS. Hoesch-Köln Neuessen Akt.-Ges. Feb. 6. (Germany, Feb. 5, '32.) 3627.

MANUFACTURE OF ALDEHYDES OF HIGH MOLECULAR WEIGHT. J. Y. Johnson (*I. G. Farbenindustrie*). Feb. 6. 3577.

MANUFACTURE OF ARTIFICIAL COMPOSITIONS. J. Y. Johnson (*I. G. Farbenindustrie*). Feb. 6. 3578.

MANUFACTURE OF AZO DYESTUFFS. J. Y. Johnson (*I. G. Farbenindustrie*). Feb. 6. 3579.

MANUFACTURE OF WETTING, ETC., AGENTS. J. Y. Johnson (*I. G. Farbenindustrie*). Feb. 9. 3994.

PRODUCTION OF REGULINE FERROBORON. I. G. Farbenindustrie. Feb. 6. (Germany, April 6, '32.) 3595.

MANUFACTURE OF ISATINS, AND INDIGOID DYESTUFFS DERIVED THEREFROM. I. G. Farbenindustrie. Feb. 6. (Germany, Nov. 26, '32.) 3646.

MANUFACTURE OF ANTHRAQUINONE DYESTUFFS. I. G. Farbenindustrie. Feb. 7. (Germany, Feb. 8, '32.) 3755.

MANUFACTURE OF CONDENSATION PRODUCTS. I. G. Farbenindustrie. Feb. 7. (Germany, Feb. 8, '32.) 3756.

MANUFACTURE OF AZO-DYESTUFFS, ETC. I. G. Farbenindustrie. Feb. 8. (Germany, Feb. 8, '32.) 3904.

MANUFACTURE OF THERAPEUTICALLY-ACTIVE PREPARATION. I. G. Farbenindustrie. Feb. 8. (Germany, Feb. 8, '32.) 3912.

MANUFACTURE OF 2-3^1 HYDROXYNAPHTHYL-2^{1}4-HYDROXY-6 : 7-BENZO-PSEUDO-AZIMINO-BENZINES AND AZO-DYESTUFFS THEREFROM. I. G. Farbenindustrie. Feb. 9. (Germany, Feb. 9, '32.) 4007, and (Germany, Feb. 9, '32.) 4008 (cognate with 4007).

MANUFACTURE OF PLASTIC MATERIALS. I. G. Farbenindustrie. Feb. 9. (Germany, Feb. 9, '32.) 4025.

SOLID VAT DYESTUFF PREPARATIONS. I. G. Farbenindustrie. Feb. 9. (Germany, Feb. 10, '32.) 4025.

MANUFACTURE OF DYESTUFFS. I. G. Farbenindustrie and J. Y. Johnson. Feb. 10. 4129.

MANUFACTURE OF COMPOSITIONS, ETC., FOR DYEING, ETC. Imperial Chemical Industries, Ltd. Feb. 8. 3856.

MANUFACTURE OF CHLOROARYLAMINES. Imperial Chemical Industries, (*Du Pont de Nemours and Co.*). Feb. 7. 3760.

JOINT PRODUCTION OF HYDROGEN PEROXIDE AND SOLUBLE BARIUM SALTS FROM BARIUM PEROXIDE. Kali-Chemie Akt.-Ges. Feb. 8. (Germany, May 7, '32.) 3910, and (Germany, May 13, '32.) 3911 (cognate with 3910).

APPARATUS FOR ELECTRICAL SEPARATION OF SUSPENDED PARTICLES FROM GASEOUS FLUIDS. Lodge-Cottrell, Ltd. (*Siemens-Lurgi-Cottrell Electrofilter-Ges, für Forschung und Patentverwertung*). Feb. 6. 3596.

MANUFACTURE OF COMPOSITIONS, ETC., FOR DYEING, ETC. M. Mendoza. Feb. 8. 3856.

RESINOUS COMPOSITIONS. H. E. Potts (*Shawinigan Chemicals, Ltd.*). Feb. 8. 3807, 3808.

RESINOUS LACQUERS, ETC. H. E. Potts (*Shawinigan Chemicals, Ltd.*). Feb. 8. 3809.

PRESSES FOR MOULDING PLASTIC SUBSTANCES. W. H. Smith. Feb. 8. 3879.

MANUFACTURE OF VITREOUS PRODUCTS. Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain, Chauny, et Cirey. Feb. 6. (France, Feb. 5, '32.) 3581, and (France, Jan. 19), 3582 (cognate with 3581).

MANUFACTURE OF CHLOROSULPHONIC ACID AND SULPHUR DIOXIDE. Soc. of Chemical Industry in Basle. Feb. 8. (Switzerland, Feb. 17, '32.. 3864.

Specifications Accepted with Dates of Application

PROCESS OF POLYMERISATING VINYL COMPOUNDS. Canadian Electro Products Co., Ltd. April 25, 1930. 387,323.

PROCESS OF CONTROLLING MOLESULAR AGGREGATION IN THE POLYMERISATION OS VINYL ESTERS. Canadian Electro Products Co., Ltd. April 30, 1930. 387,353.

MANUFACTURE OF AZO-DYESTUFFS AND INTERMEDIATE PRODUCTS. A. G. Bloxam (*Soc. of Chemical Industry in Basle*). July 6, 1931. 387,360.

ORGANIC COMPOUNDS AND METHODS OF MAKING THE SAME. E. I. Du Pont de Nemours and Co. Oct. 22, 1930. 387,325.

METHODS OF PREPARING USEFUL SUBSTANCES FROM HALOGEN-SUBSTITUTED BUTADIENES AND THE PRODUCTS SO OBTAINED. E. L. Du Pone de Nemours and Co. Feb. 28, 1931. 387,363.

MANUFACTURE OF SYNTHETIC RUBBER. E. I. Du Pont de Nemours and Co. May 14, 1931. 387,340.

MANUFACTURE OF ALIPHATIC ANHYDRIDES AND THEIR RECOVERY. H. Dreyfus. July 27, 1931. 387,365.

PRODUCTION OF ORNAMENTAL EFFECTS ON MATERIALS MADE OF, OR CONTAINING CELLULOSE ESTERS OR ETHERS. British Celanese, Ltd., and G. H. Ellis (*Rivat, G.I.* July 28, 1931. 387,343.

PROCESS AND APPARATUS FOR TREATING PHOSPHATES. L. B. Skinner. July 29, 1931. 387,329.

MANUFACTURE OF ALCOHOLIC OXIDATION PRODUCTS OF OLEFINES. H. Dreyfus. Aug. 4, 1931. 387,372.

PROCESS FOR THE MANUFACTURE OF VULCANISATION PRODUCTS RESEMBLING RUBBER. A. Carpmael (*I. G. Farbenindustrie*). Aug. 4, 1931. 387,381.

METHOD OF PRODUCING STAROL. Naugatuck Chemical Co. Aug. 22, 1930. 387,397.

PROCESS FOR THE MANUFACTURE OF WETTING, CLEANING, AND EMULSIFAING AGENTS. Chemische Fabrik vorm. Sandoz. Dec. 5, 1930. 387,398.

METOD FOR DESTRUCTIVELY HYDROGENATING COAL. British Colliery Owners' Research Association, J. I. Graham and D. G. Skinner. Sept. 10, 1931. 387,415.

PRODUCTION OF LIQUID PREPARATIONS OF TRIBROMOETHYL-ALCOHOL. Byk-Guldenwerke Chemische Fabrik Akt.-Ges. Nov. 4, 1930. 387,432.

TREATMENT OF BASIC PHOSPHATE SLAGS. Hoesch-Koln Neuessen Akt.-Ges. für Bergbau und Hutten-Betrieb. Nov. 12, 1930. 387,430.

PROCESS OF REFINING HYDROCARBONS. Improved Hydro-Carbon Processes, Ltd. Jan. 29, 1931. 387,447.

Prices of Chemical Products

Current Market Conditions

THE position of chemicals generally remains firm with a good demand. In the nitrogen fertiliser market it is reported that large orders are being received for sulphate of ammonia for immediate delivery, especially in the South of England. It is fully expected that the consumption during the year will show a considerable advance on that of 1932. Quotations for chemical products on the Manchester market during the past week have kept remarkably steady and there is much less inclination among sellers to make concessions in the few lines that were noteworthy in this respect a month or so ago. Buying interest this week has ben on moderate lines, with new orders largely confined still to near delivery positions. Contract deliveries in most of the principal sections of the market are maintained at about their recent level. Business has been quiet during the past week in the Scottish heavy chemical market. With the following exceptions, the prices of chemical products remain unaltered from last week.

General Chemicals

ARSENIC.—LONDON : £22 14s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £23 f.o.r. mines. SCOTLAND : White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER : White powdered Cornish, £24 10s.

LEAD, ACETATE.—LONDON : White, £34 per ton. Brown, £1 per ton less. SCOTLAND : White crystals, £34 to £36. Brown, £1 per ton less. MANCHESTER : White, £33; Brown, £31.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—9d. to 11d. per lb. Crude, 60's, 1s. 11d. to 2s. per gal.; 2% water, 2s. MANCHESTER : Crystals, 9¾d.; crude, 2s. 5d. SCOTLAND : Sixties, 1s. 7d. to 1s. 8d.

PITCH.—Medium soft, £4 17s. 6d. to £5 per ton. MANCHESTER : £4 10s. to £4 15s. f.o.b. LONDON : £4 10s. to £4 12s. 6d. f.o.b. East Coast port.

From Week to Week

ALTHOUGH THE LOSS AND DAMAGE caused by the fire at the Gorton Celluloid Company's works on February 12 was great, it is announced that business will be carried on as usual.

THE MEDICAL SERVICE DEPARTMENT of Imperial Chemical Industries, Ltd., has sent us a manual of notes on first aid in industrial injuries.

MR. A. E. YOUNG, who received his M.Sc. last year as a result of research work done at the new science laboratories of the University College of the South West, has been appointed chemist to the Royal Naval Cordite Factory at Holton Heath, Dorset.

JUBILEES HAVE BEEN CELEBRATED by Watson Laidlaw and Co., Ltd., chemical machinery manufacturers, and Highate and Co., oil refiners, Greenhill Oil Works, Paisley. The latter firm marked the event by paying a bonus to all employees.

SIR DUGALD CLERK, of Lukyns, Ewhurst, Surrey, and of 57 Lincoln's Inn Fields, London, W.C., consulting engineer, of Marks and Clerk, chairman of the National Gas Engine Company, Ltd., who died on November 12, left estate of the gross value of £54,413 (net personalty £41,005).

EIGHT MEN WERE INJURED in a foundry accident on February 10, in the works of James Howden and Co., Glasgow. Three workmen were operating a ladle of molten nickel, which overturned when being conveyed to a mould. The metal struck the floor and splashed over the feet and legs of those standing round, which included one of the directors of the firm and two visitors.

A CONTRACT for twelve months' bulk supplies of oil made from coal has been placed by the Admiralty with Low Temperature Carbonisation, Ltd., it was officially announced on Tuesday. The order is the first of its kind to be placed in naval history. Calculations show that the cruising radius of a vessel which has hitherto used ordinary petroleum oil will be increased by the new oil—a result of the most vital importance from the naval standpoint.

A PRELIMINARY NOTICE has been received of the sessions of the World Petroleum Congress, to be held in July. Membership of the Congress, which is organised by the Institution of Petroleum Technologists, is open to all persons interested in the industry, and the fee for membership will be 10s. All communications should be addressed to the Secretary, World Petroleum Congress, Aldine House, Bedford Street, London, W.C.2.

THE RESULT OF THE SECOND BALLOT for the election of a new secretary of the Amalgamated Society of Dyers was declared in Bradford on February 11, the figures being: G. H. Bagnall (organising secretary of the Lancashire area), 6,421; J. Dougherty (Scottish district secretary), 3,523; J. Harrison (Bradford), 2,499; M. F. Titterington (Yorkshire district secretary), 2,335. About 70 per cent. of the members took part in the ballot, and a final vote will now be taken between Mr. Bagnall and Mr. Dougherty. The voting papers in this ballot will be returnable by March 13.

THE PARIS ACADEMY OF SCIENCES, at its annual meeting, awarded the following prizes in chemistry:—Montyon prize (unhealthy trades) to Eugène Burlot for his work dealing with the safe handling of explosives and compressed gases; Raymond Horclois received a mention (1,500 francs) for his researches on the application of negative catalysis for extinguishing fires; the Jecker prize to the late Marc Bridel for his work in biological chemistry; the L. La Caze prize to Louis Hackspill for his researches in inorganic chemistry; the Cahours foundation between Paul Thomas and Paul de Graeve for work on fermentation; the Houzeau prize to Dimitri Ivanoff for his work on Grignard syntheses.

SOME INTERESTING RESEARCH upon the disinfecting power of iodine solutions recently has been published in the "Journal of the American Pharmaceutical Association." The first of three papers was prepared by G. M. Karns and describes the wetting power of iodine from various antiseptic solutions. Mr. Karns has logically assumed that the antiseptic value of an iodine solution must be a function of the ability of the solution to deposit iodine on or allow it to be absorbed by the flesh surface to be disinfected or protected from infection. This facility of giving up its iodine has been termed as the wetting power of the solution and the investigator has found that the wetting power of iodine from aqueous iodide solutions is notably superior to that from alcohol and glycerin solutions.

NEGOTIATIONS HAVE BEEN OPENED between the Drug and Fine Chemical Manufacturers' Association and the Chemical Workers' Union in connection with the proposed amendment of their existing agreement. The "Chemical Worker," the organ of the Union, reports that the employers' proposals and the Union's counter-proposals have been circulated to stewards and committees, for distribution to the members. One change which the Union is opposing is that which proposes to allow Grade 2 female workers to fill poison lines in tablet form. Against this, the Union asks that "all filling of scheduled poisons and dangerous substances, counter work excepted, shall be limited to women 21 years of age and over, and carried out in separate female departments."

THE GORDON WIGAN PRIZE for chemistry has been awarded to T. P. Hoar, M.A., Sidney Sussex College, Oxford, for a thesis, "On the mechanism of the corrosion of iron and steel."

MR. ALEX JOHNSON, chairman of the North British Rubber Co., Ltd., Edinburgh, has been elected to the Scottish Committee of the Federation of British Industries.

AN EXPLOSION OCCURRED on February 11, at the Hammerau iron works—near Reichenhall, Upper Bavaria. It is thought to have been caused by the spontaneous combustion of brown coal-gas in the pipes and furnaces of the plant. No one was injured in this explosion, which occurred after the men had left work, but it destroyed two gas generators each 30 feet high, and demolished the nearby workshops.

SIXTY-ONE BODIES have been recovered, after the gasholder explosion which took place at Neunkirchen on February 10. Some 150 people were also seriously injured. A large tar distillery owned by Burt, Boulton and Haywood, Ltd., of London, situated less than 200 yards from the destroyed plant, was badly damaged. Mr. Bates, the English manager, was cut about the head by flying glass. Several of the workpeople were also injured, and work in the distillery has had to be suspended.

MR. W. H. MOORFIELD, of Wigan, when elected president of the Manchester Coal Exchange, on February 8, said the coal of the future might be obtained by hot high pressure hydrogen being sent down the shaft instead of the present obsolete method of sending down miners with pick and drill. By this method the seams of coal would be turned into oil, which would then be pumped to the surface, and the servitude of the world's coal miners would be ended.

DR. H. W. COATES, a director of Imperial Chemical Industries, Ltd., addressing the Synthonia Lecture and Educational Section at Billingham last week, said there were signs that they were approaching, if not already turning, the corner. There had been a growing stability of internal conditions in the country. The hope of the world lay in the success of the World Economic Conference in bringing people together so that some positive action might be taken towards a gradual restoration of prosperity.

THE TOTAL VALUE OF CHEMICALS, drugs, perfumery and similar articles imported into the Irish Free State during last year amounted to £1,121,555, as compared with a total value of £1,202,440 during the previous twelve months. These figures do not include chemical fertilisers which were valued at £476,089 in 1932 and £515,201 in the previous year. The fall in the imports is attributable to the tariffs imposed by Mr. De Valera's Government last April and subsequently.

THE WINTER ISSUE of the "Journal of the National Smoke Abatement Society" contains two items of particular interest. An article "Domestic Smoke Legislation" raises a very controversial and difficult problem; it is asked whether it will be possible in the near future to consider methods for reducing domestic smoke by legislation which would either utimately prohibit the use of raw coal or would in some way penalise the user. The article entitled "An Outrageous Proposal" looks at the domestic smoke problem from a novel standpoint.

THE DOMINION DEPARTMENT OF MINES at Ottawa has just issued Mines Branch Report No. 727, containing a statement by P. V. Rosewarne and R. J. Offord as to investigations relative to "Helium in Canada from 1926-1931." The report in question brings up-to-date the data published in 1926 by Dr. R. T. Elworthy, who was then engaged on the investigation of Canadian helium resources in the Department of Mines. Copies of the report can be consulted by persons interested at the Reference Library, Canada House, Trafalgar Square, London, S.W.1.

IT IS ANNOUNCED by the London School of Hygiene and Tropical Medicine (University of London) that the next series of eight lectures and demonstrations on tropical hygiene, which are intended for men and women outside the medical profession proceeding to the tropics, will be given by Lt.-Colonel G. E. F. Sammers from March 6 to 15. These courses of instruction, in addition to providing simple rules for guidance in regard to personal hygiene and preparation for life in the tropics, will also embrace a short account of some of the more common diseases, with advice in regard to measures of protection and self-treatment. The synopsis and other particulars can be obtained from the Secretary, London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1.

Books Received

Manuel de Chimie Gaziere. By M. Emile Sainte-Claire Deville. Paris: Dunod. Pp. 234.

Calculations of Qualitative Analysis. By Carl J. Engelder. London: Chapman and Hall, Ltd. Pp. 174. 12s. 6d.

Introductory College Chemistry. By Horace G. Deming. London: Chapman and Hall, Ltd. Pp. 590. 18s. 6d.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

AGDEN SALT WORKS, LTD., Liverpool. (M. 18/2/33.) Registered January 30, mortgage to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on premises in Warrington Lane, Agden Bridge. *Nil. January 6, 1933.

ALLENS (DISINFECTANTS), LTD., Liverpool. (M. 18/2/33.) Registered February 6, £50 debenture, to H. Duringer, 4 Dunkirk Road, Birkdale; general charge.

BITMAC, LTD., Scunthorpe, tar distillers, etc. (M. 18/2/33.) Registered February 4, series of £10,000 (not ex.) debentures, present issue, £9,000; general charge. *£3,500. April 28, 1932.

CEMENT INDUSTRIES, LTD., London, S.W. (M. 18/2/33.) Registered February 3, £1,700 debentures, part of £70,000; general charge. *£59,400. December 22, 1932.

MEDWAY FINE CHEMICALS, LTD. (late Chemicalco, Ltd., and Chemico, Ltd.), London, W.C. (M. 18/2/33.) Registered January 30, £10,000 charge, to T. H. Barnes & wife, 30 Chapel Street, Belgrave Square, S.W.; charged on land and buildings at Gillingham (Kent), etc. *Nil. December 1, 1931.

Satisfactions

BRITISH CELANESE, LTD. (late British Cellulose & Chemical Manufacturing Co., Ltd., and British Cellulose & Chemical Manufacturing (Parent) Co., Ltd.), London, W. (M.S., 18/2/33.) Satisfactions registered February 2, of 1st debenture stock registered August 24, 1922, and July 6, 1923, to extent of £56,929 and of 2nd bonds registered October 14, 1927, to extent of £300,000.

STREETLY MANUFACTURING CO., LTD., Oldbury, explosive manufacturers. (M.S., 18/2/33.) Satisfaction registered February 3, of charge registered May 8, 1924.

London Gazette, &c.

Notices of Dividend

THE J. M. NEWTON VITREO-COLLOID (1928), LTD. Third and final dividend, 5s. per £, payable February 28, at the office of the liquidator, 11 Waterloo Place, London, S.W.1.

ALBY UNITED CARBIDE FACTORIES, LTD., Winchester House, Old Broad Street, London. Last day for receiving proofs, March 7. Liquidator, Sir William Barclay Peat, 11 Ironmonger Lane, London, E.C.2.

Company Winding Up

SENSIBLE HEAT DISTILLATION, LTD. (C.W.U., 18/2/33.) Statutory meetings at Bankruptcy Buildings (Court No. 2), Carey Street, Lincoln's Inn, London, W.C.2, February 21; creditors at 2.30 p.m.; contributories at 3 p.m.

Company News

Borax Consolidated, Ltd.—The directors state that they are unable to recommend payment of a dividend on the preferred ordinary shares for the year ended September 30, 1932.

Taylors (Cash Chemists) Trust, Ltd.—The directors have declared a dividend of 1½ per cent. (actual) on the 7½ per cent. cumulative preferred ordinary shares, making 3 per cent. on account of the year ending February 28, payable on that day.

Shawinigan Water and Power Co.—The statement for the year 1932 shows a gross revenue of $12,635,000, compared with $13,693,000 in 1931. Dividends at the annual rate of $1 a share were paid for the first half of 1932 and an annual rate of 50 cents for the latter half.

E. I. Du Pont de Nemours and Co.—The consolidated income account shows that the net operating income for 1932 amounted to $10,354,134, against $21,109,352 in the previous year. Dividends totalling $2.75 a share and absorbing $29,939,931, were paid during the year, with the result that, after writing down investment in General Motors Corporation by $9,981,220, the surplus carried forward is reduced from $198,933,044 to $178,717,373.

Borax Consolidated, Ltd.—For the year to September 30 last, the accounts show a trading profit of £254,855, which includes £16,439, representing interest on debentures and dividends on shares of subsidiaries. In the previous year, trading profits were shown at £238,113. After meeting fixed charges, and paying the full year's dividend on the preference shares, a balance of £202,192 remains to go forward, compared with £198,124 brought in. The annual meeting will be held at Southern House, London, on February 22, at 12 noon.

Redfern's Rubber Works.—It is stated that the revenue for the year 1932 amounted to £15,082 (against £19,779), from which is deducted depreciation of £7,684, leaving a net profit of £7,398. To this is added balance brought forward £18,251, less dividends on "A" and "B" preference shares for the half-years ending December 31, 1931, and June 30, 1932, and a final dividend on the ordinary shares for the year 1931, leaving available £13,649. The directors recommend final dividends on "A" and "B" preference shares, and a dividend of 3¾ per cent. on the ordinary shares, leaving to be carried forward £6,149.

New Companies Registered

Dawkins Enamels & Foundry Co., Ltd., Hall Road, Wednesfield, Staffs. Registered on February 9. Nominal capital £20,000 in £1 shares. Objects: To acquire the business of enamel manufacturers formerly carried on by W. A. Dawkins and Eliza M. Dawkins, and to carry on the business of manufacturers of and dealers in vitreous enamels, paints, colours, and varnishes, heating devices, furnaces, oil and other burners, etc. Directors: W. A. Dawkins, and Mrs. E. M. Dawkins.

Earl Fitzwilliam's Collieries Co. Registered as a private unlimited company on February 7. Nominal capital of £1,500,000 in £1 shares. The objects are to acquire the business of a colliery proprietor carried on by Earl Fitzwilliam at Elsecar and Greasbrough, Yorks, as "Earl Fitzwilliam's Collieries," and to carry on the business of mine and quarry owners, manufacturers of and dealers in sulphate of ammonia, benzol, pitch, tar, asphaltum and other derivatives from coal, dye and colour, makers, manufacturers of and dealers in chemicals and manures, etc. Directors: Earl Fitzwilliam, Wentworth Woodhouse, near Rotherham, and Viscount Milton.

Economic Water Softeners, Ltd., 7 Mill Lane, Solihull, Warwickshire. Registered on January 31. Nominal capital £2,000 in £1 shares. Manufacturers and erectors of and dealers in all types of water softening apparatus, manufacturers of and dealers in all kinds of chemical compounds, etc.

English Gelatine & Phosphates, Ltd., Thames House, Millbank, Westminster, London, S.W.1. Registered on February 2. Nominal capital £60,000 in £1 shares. Manufacturers, importers and exporters of and dealers in gelatine of all kinds, phosphates, isinglass, glue and any kindred substances and their intermediates; chemists, druggists, drysalters, oil and colour men, etc. Subscribers: Robert Walter and Francis C. Forbes.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Lithuania.—H.M. Consul at Kovno reports that the Lithuanian Railway Administration is calling for tenders, to be presented in Kovno by February 23, for the supply of 2,000 kilogrammes of tin, of not less than 99 per cent. purity. (Ref. G.X. 12275.)

Norway.—A commission agent established at Oslo wishes to obtain the representation of United Kingdom producers of zinc write, ground chalk for technical purposes, earth colours and cotton waste, on a commission basis. Correspondence may be in English. (Ref. No. 267.)

Forthcoming Events

Feb. 18.—North of England Institute of Mining and Mechanical Engineers and the Coke Oven Managers' Association (Northern Section). 2.30 p.m. Lecture Theatre of the Institute, Newcastle-on-Tyne.

Feb. 20.—Society of Chemical Industry (Yorkshire Section) and Institute of Chemistry (Leeds Area Section). "Detection and Determination of Small Amounts of Substances by Colorimetric Methods." N. Strafford. 7.30 p.m. University, Leeds.

Feb. 21.—Royal Institution. "Analysis of Crystal Structure by X-Rays: A Review of the Work of Twenty Years." Sir William Bragg. 5.15 p.m. 21 Albemarle Street, London.

Feb. 21.—Hull Chemical and Engineering Society. "Manufacturing Overseas." F. H. Peck. 7.45 p.m. Grey Street, Park Street, Hull.

Feb. 21.—Leicester Literary and Philosophical Society (Chemistry Section). "Diet in Relation to Disease." Dr. J. B. Orr. 7.45 p.m. University College, University Road, Leicester.

Feb. 22.—British Wood Preserving Association. "Paint and Varnish as Wood Preservatives." Dr. L. A. Jordan. 6 p.m. Auctioneers' and Estate Agents' Institute, 29 Lincoln's Inn Fields, London, W.C.2.

Feb. 21.—Society of Dyers and Colourists (Huddersfield Section). "Vat Dyestuffs on Rayon." W. M. Todd.
Feb. 22.—Electroplaters' and Depositors' Technical Society. Birmingham Conference. "Plating of Zinc Base Die Castings." L. Wright and F. Taylor. "Anodic Oxidation of Aluminium and its Alloys." S. Wernick.
Feb. 22.—Institution of the Rubber Industry (Scottish Section). Questions night. The Institution of Engineers and Shipbuilders, Elmbank Crescent, Glasgow.
Feb. 22.—Royal Society of Arts. "Industrial Research with Biological Material." Sir William B. Hardy. 8 p.m. John Street, Adelphi, London.
Feb. 23.—Manchester College of Technology Students' Chemical Society. "Explosives." Dr. A. G. White. 5 p.m. Large Chemical Lecture Theatre, E.17, Manchester College of Technology.
Feb. 23.—Society of Dyers and Colourists (West Riding Section). "Part II. The X-Ray Interpretation of the Molecular Structure and Properties of Wool and other Animal Fibres." Dr. W. T. Astbury.
Feb. 24.—Society of Dyers and Colourists (Scottish Section). "Enzymes for Textile Purposes." Jack E. Evans.
Feb. 24.—Manchester Literary and Philosophical Society (Chemical Section). "Processes of Glass Manufacture." L. M. Angus Butterworth. 7 p.m. 36 George Street, Manchester.
Feb. 24.—The West Cumberland Society of Chemists and Engineers. Symposium on "Phosphorus in Coke, Iron and Steel." 7 p.m. Workington.
Feb. 24.—Society of Chemical Industry and Institute of Chemistry (South Wales Sections). "The Stability of Cyclic Compounds." Dr. F. J. F. Dippy. 7.15 p.m. Technical College, Cardiff.
Feb. 24.—Royal Institution of Great Britain. "The Photographic Analysis of Explosion Flames." Professor W. A. Bone. 9 p.m. 21 Albemarle Street, London.